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Kanektok River Salmon Monitoring and Assessment, 2009

Final Report for Project FIS 07-305
USFWS Office of Subsistence Management
Fisheries Resource Monitoring Program

by

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and

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Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

Kanektok River is the primary salmon spawning drainage in the Quinhagak area and supports subsistence, commercial, and sport fisheries. The Alaska Department of Fish and Game, in cooperation with U.S. Fish and Wildlife Service and the Native Village of Kwinhagak, has operated a resistance board weir on Kanektok River since 2001 to estimate escapement and provide a platform to collect samples used in estimating age, sex, and length for Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, and coho *O. kisutch* salmon. In 2009, the weir was operational from 5 July through 11 August. Total escapement past the weir during the 2009 operational period was estimated at 6,841 Chinook, 272,483 sockeye, 51,652 chum, and 2,336 coho salmon and 26,606 Dolly Varden. The Chinook salmon escapement was the lowest recorded, while sockeye salmon had the second highest escapement on record and the chum salmon escapement was near average. The Chinook salmon escapement was comprised of 62.7% males and dominated by age-1.4 (49.5%) fish. The sockeye salmon escapement was comprised of 48.3% males and dominated by age-1.2 (62.1%) fish. The chum salmon escapement was comprised of 64.3% males and dominated by age-0.3 (68%) fish. The 2009 District W-4 commercial harvest was 13,920 Chinook, 112,153 sockeye, 48,115 coho, and 91,158 chum salmon, for a total of 265,346 fish. Samples were also collected from the District W-4 commercial catch for use in estimating age, sex, and length of the 2009 commercial harvest. Aerial surveys were not flown in 2009.

Key words: Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, coho *O. kisutch*, District W-4, Dolly Varden *Salvelinus malma*, Kanektok River, Kuskokwim Area, rainbow trout *O. mykiss*, resistance board weir, salmon, sockeye *O. nerka*, whitefish *Coregonus* spp.

INTRODUCTION

Kanektok River is located in Togiak National Wildlife Refuge in southwestern Alaska (Figure 1). The Kanektok River watershed drains approximately 1,295 km^2 of surface area and empties into Kuskokwim Bay near the village of Quinhagak. The upper portion of the river consists primarily as a single channel flowing through mountainous terrain. The lower portion of the river flows through a broad fluvial plain and is highly braided with many side channels. The Kanektok River and its many tributaries drain approximately 1,295 km^2 of surface area, dominated largely by undisturbed tundra. The surrounding riparian vegetation is composed primarily of cottonwood, willow, and alder. Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, chum *O. keta*, coho *O. kisutch,* and pink salmon *O. gorbuscha* spawn in the Kanektok River drainage.

In the State of Alaska, the Department of Fish and Game is responsible for managing salmon fisheries in a manner consistent with Sustainable Salmon Fisheries Policy (5 AAC 39.222). This task requires long-term monitoring projects that reliably measure annual escapement to key spawning systems as well as track temporal and spatial patterns in abundance that influence management decisions. The Kanektok River weir has operated since 2001 in an effort to develop a reliable long-term data set.

SALMON FISHERIES

Subsistence fishing for salmon occurs throughout the Kanektok River drainage, in nearby Quinhagak area streams, and in Kuskokwim Bay. Salmon caught for subsistence use make an important contribution to annual subsistence harvests of residents from Quinhagak, Goodnews Bay, Eek, and Platinum (Whitmore et al. 2008). The Alaska Department of Fish and Game (ADF&G) has quantified subsistence harvests in the Quinhagak area since 1968, and methods have been consistent since 1988. The subsistence salmon harvests from 1988 to 2007 have ranged from approximately 6,000 to 15,000 fish (Fall et al. 2009). From 1998 to 2007, annual subsistence harvests have averaged 3,335 Chinook, 1,526 sockeye, 1,350 chum, and 1,430 coho salmon (Appendix A1).

Commercial salmon fishing has occurred in the Quinhagak area since before statehood. In 1960, commercial fishing District W-4 was established offshore of Quinhagak in Kuskokwim Bay (Figure 2). Since the inception of District W-4, its northern boundary has been shifted between Weelung Creek and Oyak Creek in response to overcrowding issues and concern over the interception of fish bound for Kuskokwim River. In 2004, the Alaskan Board of Fish (BOF) extended the northern boundary 3 miles north up the coast from the southern edge of Oyak Creek to the northernmost edge of the mouth of Weelung Creek. The southern boundary is located at the southernmost edge of the mouth of Arolik River. The District W-4 commercial fishery targets Chinook, sockeye, and coho salmon. Chum and pink salmon are harvested incidentally, with pink salmon being the least commercially valuable species (Whitmore et al. 2008). District W-4 commercial fishery participation has shown a general decline since 1999. The decline is likely attributable to poor market value of salmon since 1995, increasing fuel prices, limited number of tenders, limited processing capacity, and other economic opportunity in the area.

Since 1960, commercial salmon harvests in District W-4 ranged from 3,918 to 273,553, with a historic average of 119,495 salmon. Total harvests have increased since the low years of 2001 and 2002 when market demands and processing capacity were low. The most recent 10 year average harvest (1999 to 2008) was 151,631 salmon and the most recent 5 year average harvest (2004 to 2008) was 193,558 salmon (Appendix A1). Since 1970, the number of commercial salmon permits ranged from 61 in 1971 to 409 in 1993. In 2001 the number of permits fished fell below 200 for the first time since 1982 and fishing effort has remained below 200 permits since that time (Whitmore et al. 2008).

In addition to commercial and subsistence harvest, Kanektok River also supports a popular sport fishery. Sport anglers target salmon, rainbow trout *O. mykiss*, Dolly Varden *Salvelinus malma,* and Arctic grayling *thymallus arcticus* from mid June to the beginning of September each year, there are currently 3 seasonal sport fishing guide camp operations located on Kanektok River and numerous guided and non-guided anglers that float Kanektok River from its headwaters to the village of Quinhagak.

ESCAPEMENT MONITORING

Kanektok River is the primary spawning stream within District W-4. Establishing a viable method for monitoring and assessing salmon escapement in Kanektok River has been problematic. The first attempted monitoring project was a counting tower established in 1960 on the lower river near the village of Quinhagak (ADF&G 1960). This tower project was plagued by logistical problems, poor water visibility, and difficulties with species apportionment. In 1961, the tower was relocated to the outlet of Kegati/Pegati Lake (Figure 1) and operated through 1962 (ADF&G 1961, 1962). Although successful in providing sockeye salmon escapement information, operation of the tower at this site was discontinued after 1962. Enumeration using hydroacoustic sonar was tried from 1982 through 1987, however, the use of sonar was deemed unfeasible because of technical obstacles, site limitations, and budget constraints (Huttunen 1984–1986, 1988; Schultz and Williams 1984). In 1996, a cooperative effort between the Native Village of Kwinhagak (NVK), United States Fish and Wildlife Service (USFWS), and ADF&G reinitiated a counting tower located 15 miles upriver from the mouth of Kanektok River. The counting tower again proved to have limited utility (Fox 1997) despite improvements to the project in 1998 (Menard and Caole 1999). In 1999, resources were redirected toward developing a resistance board weir (Burkey et al. 2001). The weir was operational briefly in 2000, but high

water levels, technical limitations, and personnel problems precluded the project from meeting its objectives (Linderman 2000). During operation in 2000, the site was determined incapable of facilitating a weir because of extensive bank erosion.

In 2001, the weir was relocated approximately 20 miles upriver from the original site (Estensen and Diesigner 2003). This relocation required a "Special Use Permit" from the USFWS to operate within the congressionally designated Wilderness Area. The weir was successfully installed and operated in 2001; however, installation was delayed until 10 August because of high water. In 2002, an attempt was made to install the weir just after ice-out in early May, but high water still delayed complete installation until late June. In 2003, crews arrived on-site even earlier and successfully installed the weir during the last week of April, before snowmelt and spring precipitation raised water levels beyond a workable point. Installation and successful operation of the weir is dependent upon early installation in late April, just after ice-out. When feasible, an early installation strategy is employed annually. The project continues as a cooperative venture between ADF&G, USFWS Togiak National Wildlife Refuge, USFWS OSM, and NVK. As a result of complications with high water during the coho salmon run, the weir is no longer operated through the coho salmon season. Formal escapement goals have not been developed for any species at this weir (Estensen et al. 2009).

Kanektok River salmon escapements have also been monitored by aerial surveys since 1962 (Appendix B1). Aerial survey escapement assessment can be variable depending on viewing conditions and observers; however, when observers, timing, and methods are standardized and survey conditions meet acceptable criteria, the resulting counts are used as an index of escapement. Procedures established in recent years have increased the annual consistency of Kanektok River aerial surveys through the creation of an aerial survey location database, intensive pre-flight planning, and establishment of a dedicated aerial survey project staff. Additionally, variability between observers and methods has been addressed through standardized training and consistency of observers, pilots, and aircraft used in recent years. Aerial surveys targeting Chinook and sockeye salmon are the most reliable for indexing spawning populations. Chum salmon have protracted run timing, which requires multiple surveys throughout the run to ensure accuracy of the index. In addition to timing issues, chum salmon can be problematic for observers to get an accurate index of escapement because of the difficulty of seeing mature spawning populations in deep or slightly turbid conditions in the water column. Chum salmon aerial surveys have been discontinued as an escapement index until survey methods can be improved or funding can be secured to allow for multiple aerial surveys of chum salmon populations throughout the duration of their runs. Additionally, Kanektok River coho salmon have been difficult to survey because of poor fall weather conditions. Coho salmon aerial surveys have been conducted when funding and weather conditions allow. Aerial survey sustainable escapement goals (SEG) have been established for Chinook, sockeye, and chum salmon (Table 1). These goals were established in 2005 and were reviewed without changes in 2009 (Estensen et al. 2009).

Spawning occurs downstream of the weir for Chinook, sockeye, chum, pink, and coho salmon. Escapement counts obtained from the weir are evaluated as an index of escapement for these species and are used in combination with aerial survey counts to estimate escapement for the entire Kanektok River drainage.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Annual escapement and commercial harvest age, sex, and length (ASL) composition estimates are used to develop stock-recruitment models, which, in turn, provide information for projecting future run sizes. Available escapement ASL information for Chinook, sockeye, chum, and coho salmon is limited. Historical summaries of existing ASL information for salmon returning to Kanektok River can be found in Molyneaux et al. (2008). Historical escapement ASL samples prior to 1997 are not included in these summaries (e.g. Huttunen 1984–1986, 1988).

OBJECTIVES

Annual project objectives are:

1. Enumerate the daily passage of Chinook, chum, sockeye, and coho salmon through the weir from 25 June through 15 August.
2. Estimate run timing of Chinook, sockeye, and chum salmon and Dolly Varden at the Kanektok River weir.
3. Estimate the ASL composition of annual Chinook, sockeye, and chum salmon escapements from a minimum of 3 pulse samples, collected from each third of the run, such that 95% simultaneous confidence intervals for the age composition in each pulse have a maximum width of ±10% (α=0.05 and d=0.10).
4. Estimate Dolly Varden passage through the Kanektok River weir.
5. Record atmospheric and hydrologic conditions at the weir site.

METHODS

SITE DESCRIPTION

The Kanektok River weir is located 67.60 km upstream from the mouth at GPS coordinates N 59° 46.057, W 161° 03.616. The channel width is approximately 76 m wide. The water depth during weir operations ranges from approximately 0.3 to 1.8 m deep. The bottom substrate is primarily cobblestone, gravel, and sand.

RESISTANCE BOARD WEIR

The design, construction, and installation of the Kanektok River resistance board weir largely followed those described in Stewart (2002, 2003, and 2004) and Tobin (1994). Additional details concerning the resistance board weir components used on Kanektok River are described in Estensen and Diesinger (2004).

Two fish passage chutes were installed on the weir, (looking downstream) one approximately 30.48 m from the left bank and the other approximately 7.62 m from the right bank. Gates were attached on both chutes to regulate fish passage. A 3 m by 4.6 m live trap installed directly upstream of the right bank passage chute was used to collect fish for ASL sampling. Picket spacing allowed smaller fish, such as pink salmon and other non-salmon species, to pass through the weir between pickets. Fish that migrated downstream, such as rainbow trout, Dolly Varden, and whitefish *Coregonus* spp. required an avenue for safe passage over the weir. Downstream passage chutes described in Linderman et al. (2002) were installed to facilitate passage. Downstream fish passage over these chutes was not enumerated.

Boat passed at a designated boat gate as described in Estensen and Diesigner (2004). Boats with jet-drive engines were the most common and could pass over the boat gate panels independent of the crew by reducing speed. Rafts could pass downstream by submerging the boat passage panels and drifting over the weir. Boats with propeller-drive engines were uncommon and required being towed upstream across the weir with the assistance of crew members.

ESCAPEMENT MONITORING AND ESTIMATES

To determine salmon escapement past the weir, fish passage counts were made daily during the operational period of the project. Passage counts occurred regularly throughout the day, typically for 1–2 hour periods, beginning in the morning and continuing as late as light permitted. During counting periods, fish passage chute gates were opened allowing fish through the weir. Crew members identified and enumerated all fish by species as they passed upriver through the chutes. Any fish observed traveling downstream through the fish passage chutes were subtracted from the tally.

Weir escapement was estimated for periods when the weir was inoperable and when breach events occurred. Estimates were assumed to be zero if passage was considered negligible based on historical data and run timing indicators. When the weir is not operational for part or all of one day the 'Single Day Method' was used. An estimate for the inoperable day is calculated using the following formula:

$$\hat{n}_{d_i} = \left(\frac{\left(n_{d_i-2} + n_{d_i-1} + n_{d_i+1} + n_{d_i+2} \right)}{4} \right) - n_{o_i} \qquad (1)$$

Where:

n_{d_i-1}, n_{d_i-2} = Observed passage of 1, 2 days before the weir was washed out;

n_{d_i+1}, n_{d_i+2} = Observed passage of 1, 2 days after the weir was reinstalled; and,

n_{o_i} = Observed passage (if any) from the given day (i) being estimated.

Daily estimated salmon passage then became the sum of any observed passage from the day the weir breach occurred and the breach estimate.

Weir escapement was also estimated for periods when the weir was not operational, but within the targeted operational dates using the 'Proportion Method'. Estimates were calculated based on the proportional relationship between observed weir counts at the Kanektok River weir and weir counts from a model data set. The model data set may be from a different year at Kanektok River or from the same year at a neighboring project. The model data set was selected based on the strongest (Pearson) correlation between observed passage during the operational period at Kanektok River weir and observed passage from the model data set during the same time period. Daily passage estimates were the result of relative daily passage proportions of the model data set minus any observed passage from the day being estimated, and were calculated using the formula:

$$\breve{n}_d = \left(\frac{\left(n_{dc} \times \left(\sum_{d_z}^{d_a} y_e \right) \right)}{\left(\sum_{d_z}^{d_a} y_c \right)} \right) - n_{d_e} \quad (2)$$

Where:

$\breve{n}_d$ = passage estimate for the day weir was not operational,

n_{dc} = the number of fish per species that passed the weir on that day for the corresponding year,

$\sum_{d_z}^{d_a} y_e$ = the sum of all daily counts per species for the year being estimated,

$\sum_{d_z}^{d_a} y_c$ = the corresponding sum of all daily counts per species, for the year with the strongest correlation to the year being estimated, and

n_{d_e} = the number of fish per species that passed the weir on that day for the year being estimated.

AGE, SEX, AND LENGTH SAMPLING

Escapement sampling for Chinook, sockeye, and chum salmon ASL composition estimates was conducted based on the pulse sampling design of Molyneaux et al. (2006). The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon. These sample sizes provided simultaneous 95% confidence interval estimates of age composition ±10%, and are adjusted from sample sizes recommended by Bromaghin (1993) to account for unreadable scales. The minimum number of pulse samples was one per species from each third of the run.

The weir crew conducted active sampling to increase Chinook, sockeye, chum, and coho salmon sample sizes. Active sampling consisted of capturing and sampling target species of salmon while actively passing and enumerating all other fish. Crew members used a dip net to capture fish within the holding box. Fish were removed from the dip net and placed on a partially submerged fish measurement board. After sampling, fish were released upstream of the weir. During times when abundance of species passing through the weir was low, crew used dip nets to capture fish from behind the weir for sampling purposes.

Commercially harvested salmon were sampled at the Quinhagak and Platinum processing plants. Processor workers supplied sampling crews with totes of iced fish for sampling. Pulse samples were collected from a minimum of 3 commercial openings, each representing a third of the total harvest. The goal for each pulse was to collect samples from 210 Chinook, 210 sockeye, 200 chum, and 170 coho salmon.

For both escapement and commercial sampling, scales were removed from the preferred area of the fish (INPFC 1963). A minimum of 3 scales were removed from each Chinook and coho salmon, and 1 scale was removed from chum and sockeye salmon. Scales were mounted on numbered and labeled gum cards. For escapement samples, sex was determined by visually examining external morphology such as the development of the kype, roundness of the belly, and the presence or absence of an ovipositor. Sex was determined for commercially harvested fish by

visual inspection of internal gonads. In both cases, length was measured to the nearest millimeter from mideye to tail fork. After sampling was concluded, gum cards and data forms were complete and returned to the Bethel ADF&G offices for processing.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

ADF&G staff in Bethel and Anchorage processed ASL data and generated data summaries (Molyneaux et al. 2008). Two types of summary tables were compiled for each species; one described the age and sex composition and the other described length characteristics. These summaries account for ASL composition changes over the season by first partitioning the season into temporal strata based on pulse sample dates, applying age and sex composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated age and sex composition for the season. This procedure ensured ASL composition estimates were weighted by fish abundance in the escapement or harvest rather than fish abundance in the samples. Likewise, estimated mean length composition was calculated by weighting sample mean lengths from each stratum by the escapement or harvest of salmon during that stratum.

Ages are reported in the tables using European notation. European notation is composed of two numerals separated by a decimal, where the first numeral indicates the number of winters spent in fresh water and the second numeral indicates the number of winters spent in the ocean (Groot and Margolis 1991). Total age is equal to the sum of these two numerals plus one to account for the single winter of egg incubation in the gravel. Original ASL gum cards, acetates, and mark-sense forms are archived at the ADF&G office in Anchorage. Computer files were archived by ADF&G in the Anchorage and Bethel offices.

AERIAL SURVEYS

No salmon enumeration surveys were flown in 2009 because of poor weather. In previous years, aerial survey flights were conducted from fixed-wing aircraft flown at an altitude of 500 ft. Attempts are made to conduct aerial surveys during peak spawning periods for each species in order to maximize the number of observable fish on the spawning grounds. Peak spawning periods were developed from run timing estimates and vary by species. Aerial surveys were numerically ranked on the scale of 1 = good, 2 = fair, and 3 = poor, based on survey method, weather and water conditions, time of survey, and spawning stage. Only surveys with rankings of fair or good (1 or 2) were used as indices of escapement.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrologic conditions were recorded daily at 10:00 am and 5:00 pm. Cloud cover was estimated by percent covered and elevation; wind speed was estimated in miles per hour and direction was noted; precipitation was measured in inches per 24 hours, daily air and water temperature were recorded in degrees Celsius. The river gage height was recorded daily and was pegged to a benchmark established in 2001 and consists of a ¾ inch diameter steel rebar driven into the river bed adjacent to the camp. The top of the benchmark represents a river stage of 100 cm. The river gage is a steel rule installed near shore in the river and the 100 cm mark is pegged level with the top of a benchmark to achieve relative water level between years.

RESULTS

SALMON FISHERIES

Subsistence harvest estimates for salmon in the Quinhagak area for 2009 were not available. Based on discussions with local residents, it is anticipated subsistence harvest fell within the amounts necessary for subsistence ranges for all species. In the District W-4 commercial fishery 179 permit holders participated for a total harvest of 13,920 Chinook, 112,153 sockeye, 91,158 chum, and 48,115 coho salmon (Table 2). Exvessel value by species was $130,158 for Chinook, $382,129 for sockeye, $96,057 for chum, and $136,562 for coho salmon, for a total value of $744,906.

PROJECT OPERATIONS

The weir was operated from 5 July through 11 August. Late ice break-up and high water level prevented early installation of the weir. Persistent high water level through mid June prevented the weir from being operational by the target date of June 25. Coho salmon are no longer an objective species because water levels late in summer are normally high. A decision was made to remove the weir after 3 consecutive days of less than 1% of the overall sockeye salmon run passed upstream.

A breach in the weir caused by broken weir panel pickets occurred for 8 hours on 27 July and was repaired by late evening the same day. This was the only breach from 5 July to 11 August.

WEIR ESCAPEMENT

Escapement estimates for Chinook, sockeye and chum salmon passage during the target operational period of 25 June to 15 August were not made for missed passage outside of the operational period of 5 July to 11 August. A model data set was unavailable for 2009 so an estimate could not be obtained based on the 'Proportion Method'. It is known that Chinook, sockeye, and chum salmon migrated past the weir prior to its operation; however, it is thought that the number of salmon passage missed was minor compared to the overall escapement. Based on daily passage of Chinook, sockeye, and coho salmon, missed passage during the 27 July breach was estimated at zero using the 'Single Day Method'. Estimates are the same as observed passage and should be considered minimum escapements. Missed chum salmon passage, at the time of the breach, was estimated to be 27 fish and is included in the total escapement.

Chinook salmon escapement at the weir in 2009 was estimated to be 6,841 fish (Table 1). Based on the observed passage, the median passage date was 22 July and the central 50% of the run occurred between 17 July and 27 July (Table 3).

Sockeye salmon escapement in 2009 was estimated to be 272,483 fish (Table 1). Based on the observed daily passage, the median passage date was 14 July and the central 50% of the run occurred between 10 July and 19 July (Table 3).

Chum salmon escapement in 2009 was estimated to be 51,652 fish (Table 1). Based on the observed daily passage and inclusive of estimated passage, the median passage date was 17 July and the central 50% of the run occurred between 12 July and 23 July (Table 3).

Observed coho salmon passage in 2009 was 2,336 fish (Table 1). The first coho salmon were observed on 17 July and they continued to pass upstream well after weir operations ceased (Figure 3).

The total count of pink salmon upstream of the Kanektok River weir in 2009 was 1,246 fish (Table 4). Passage estimates were not made for pink salmon.

Dolly Varden, whitefish, and rainbow trout were also counted through the weir in 2009. A total of 26,056 Dolly Varden, 81 whitefish, and 150 rainbow trout were observed passing upstream during project operations (Table 4). Passage estimates were not made for non-salmon species.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Kanektok River Weir Escapement

Minimum sample objectives were met for Chinook, sockeye, and chum salmon. Observed escapement was partitioned into temporal strata based on sample dates. The minimum sample objective for coho salmon was not met. However, the collected samples were applied to the observed escapement.

Scale samples, sex and length were collected from 570 Chinook salmon at the weir in 2009. Age was determined for 468 Chinook salmon sampled (82%). Escapement was partitioned into 3 temporal strata based on sample dates. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±4%. Applied to escapement, age-1.4 Chinook salmon was the most abundant age class (49.5%), followed by age-1.2 (26.2%), and age-1.3 (23.2%) fish (Table 5). Sex composition from sampled fish was 62.7% males and 37.3% females. Mean male length from sampled fish by age class was 565 mm for age-1.2, 702 mm for age-1.3, and 808 mm for age-1.4 fish. Mean female length from sampled fish by age class was 803 mm for age-1.3, and 859 mm for age-1.4 fish. Overall, male lengths ranged from 400 to 1004 mm and female lengths ranged from 629 to 1040 mm (Table 6).

Scale samples, sex and length were collected from 700 sockeye salmon at the weir in 2009. Age was determined for 585 sockeye salmon sampled (83.5%). Escapement was partitioned into 3 temporal strata based on sample dates. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±4%. Applied to escapement, age-1.2 sockeye salmon was the most abundant age class (62.1%), followed by age-1.3 (34.9%) (Table 7). Sex composition from sampled fish was 48.3% males and 51.7% females. Mean male length from sampled fish by age class was 537 mm for age-1.2, and 582 mm for age-1.3 fish. Mean female length from sampled fish by age class was 509 mm for age-1.2, and 545 mm for age-1.3 fish. Overall, male lengths ranged from 426 to 679 mm and female lengths ranged from 418 to 610 mm (Table 8).

Scale samples, sex and length were collected from 660 chum salmon at the weir in 2009. Age was determined for 631 chum salmon sampled (96%). Escapement was partitioned into 4 temporal strata based on sample dates. Overall, 95% confidence intervals for age composition of annual escapement were no wider than ±4%. Applied to escapement, age-0.3 chum salmon was the most abundant age class (68%), followed by age-0.4 (29.4%) fish (Table 9). Sex composition from sampled fish was 64.3% males and 35.7% females. Mean male length from sampled fish by age class was 597 mm for age-0.3, and 615 mm for age-0.4 fish. Mean female length from sampled fish by age class was 566 mm for age-0.3, and 576 mm for age-0.4 fish. Overall, sampled male lengths ranged from 510 to 708 mm and female lengths ranged from 491 to 666 mm (Table 10).

Scale samples, sex and length were collected from 120 coho salmon at the weir in 2009. Age was determined for 100 coho salmon sampled (83.3%). Overall, 95% confidence intervals for age

composition of observed passage were no wider than ±5.5%. Applied to observed passage, age-2.1 coho salmon was the most abundant age class (91%), followed by age-3.1 (7%) fish (Table 11). Sex composition from sampled fish was 49% males and 51% females. Mean male length by age class was 582 mm for age-2.1, and 594 mm for age-3.1 fish. Mean female length by age class was 589 mm for age-2.1, and 595 mm for age-3.1 fish. Overall, male lengths ranged from 491 to 648 mm and female lengths ranged from 504 to 659 mm (Table 12).

District W-4 Commercial Harvest

Minimum sample objectives for Chinook and coho salmon were not achieved; however, results were considered adequate for estimating ASL composition of District W-4 commercial harvest. Minimum sample objectives for sockeye and chum salmon were achieved. Samples were partitioned temporally into strata based on sample dates.

Age was determined for 567 Chinook salmon sampled. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±4.2%. Applied to total commercial harvest, age-1.2 Chinook salmon was the most abundant age class (44.5%), followed by age-1.3 (26.9%), and age-1.4 (26%) fish (Table 13). Estimated sex composition was 82.4% males and 17.6% females. Mean male length by age class was 539 mm for age-1.2, 665 mm for age-1.3, and 785 mm for age-1.4 fish. Mean female length by age class was 588 mm for age-1.2, 787 mm for age-1.3, and 836 mm for age-1.4 fish. Overall, male lengths ranged from 305 to 1005 mm and female lengths ranged from 558 to 996 mm (Table 14).

Age was determined for 976 sockeye salmon sampled. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±3.9%. Applied to total commercial harvest, age-1.2 sockeye salmon was the most abundant age class (53.8%), followed by age-1.3 (40.5%) fish (Table 15). Sex composition was estimated to be 48.3% males and 51.7% females. Mean male length by age class was 532 mm for age-1.2, and 575 mm for age-1.3 fish. Mean female length by age class was 512 mm for age-1.2, and 543 mm for age-1.3 fish. Overall, male lengths ranged from 426 to 660 mm and female lengths ranged from 432 to 633 mm (Table 16).

Age was determined for 1,101 chum salmon sampled. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±3.4%. Applied to total commercial harvest, age-0.3 chum salmon was the most abundant age class (69.3%), followed by age-0.4 (27.1%) fish (Table 17). Sex composition was estimated to be 44.6% males and 55.4% females. Mean male length by age class was 586 mm for age-0.3, and 592 mm for age-0.4 fish. Mean female length by age class was 558 mm for age-0.3, and 563 mm for age-0.4 fish. Overall, male lengths ranged from 490 to 689 mm and female lengths ranged from 500 to 717 mm (Table 18).

Age was determined for 198 coho salmon sampled. Overall, 95% confidence intervals for age composition of the harvest were no wider than ±4.2%. Applied to total commercial harvest, age-2.1 coho salmon was the most abundant age class (89.9%), followed by age-3.1 (8.1%) fish (Table 19). Sex composition was estimated to contain 55.6% males and 44.4% females. Mean male length by age class was 560 mm for age-2.1, and 561 mm for age-3.1 fish. Mean female length by age class was 578 mm for age-2.1, and 573 mm for age-3.1 fish. Overall, male lengths ranged from 399 to 657 mm and female lengths ranged from 499 to 638 mm (Table 20).

AERIAL SURVEYS

Aerial surveys were not conducted in 2009 because of poor weather conditions.

ATMOSPHERIC AND HYDROLOGICAL MONITORING

Atmospheric and hydrological observations were recorded daily from 21 June through 29 August (Table 21). Air temperatures ranged from 8.9˚ to 30.5˚ C. Water temperature ranged from 7˚ to 14˚ C. The largest single rain event occurred on 29 July and resulted in an accumulation of .41 in (≈ 1.04 cm) during this 24 hour period. The Kanektok River weir did not experience heavy rain events in 2009 and water level stayed within operable levels. The river displayed a general decreasing trend in water levels throughout the season. Water levels at the weir site ranged from approximately 0 to 36 cm for the recorded period.

DISCUSSION

SALMON FISHERIES

The inability of obtaining subsistence results inseason prevented the reporting of totals before publication of this report. Results are typically available in the following year's report. Subsistence harvest totals are relatively consistent among years; therefore the 10 year average is utilized as a valid approximation of 2009 subsistence harvest amount.

The District W-4 commercial Chinook, sockeye, chum, and coho salmon harvests were above the recent respective 10 year averages.

PROJECT OPERATIONS

Operation of the weir in 2009 was generally successful and the majority of the Chinook, sockeye and chum salmon escapement was observed. Total enumeration of coho salmon was not possible, because the coho salmon run continued well after the end of operations in 2009.

Reoccurring periods of high water in mid-September has complicated late season removal of the weir in past years. ADF&G, in consultation with NVK and USFWS determined removal of the weir should occur in mid August; prior to the period that high water normally occurs. Early weir removal was successful, with the exception of the rail and cable, which were left in place for ease of installation the following season. Early removal prevents weir component damage from over-wintering in the river, as experienced in 2005 (Jones and Linderman 2006). An additional benefit of early removal is that it allows time for crew to repair inseason damage to the weir as part of normal camp closing procedures.

ESCAPEMENT MONITORING AND ESTIMATES

The Chinook salmon escapement estimate for 2009 is similar to 2008, which was the lowest escapement among seven years of collected data (Figure 4; Appendix C1). Results in 2009 may have been affected by missed passage during 25 June through 5 July. Chinook salmon run timing was near average (Figure 3). Historically, passage by 5 July has been 0% to 5% (≈0–340 fish) of total escapement.

The sockeye salmon escapement estimate for 2009 was higher than average and the second largest among seven years of collected data (Figure 4; Appendix C1). Results in 2009 may have been affected by missed passage during 25 June through 5 July. Sockeye salmon run timing was near average (Figure 3). Historically, passage by 5 July has been 0% to 10% (≈0–27,250 fish) of the total.

The estimated chum salmon escapement in 2009 was near the historical average from 2002 through 2008 (Figure 4; Appendix C1). Run timing was average and likely not affected by late start of weir operations (Figure 3). Historically, passage by 5 July has been 0% to 3% (≈0–1,550 fish) of total escapement. Any unaccounted passage is considered minimal. Chum salmon escapements in Kanektok River from 2002 through 2009 indicate relative stability. However, the weir results do not account for the large number of chum salmon, perhaps in excess of weir escapements, known to spawn downstream of the weir.

The observed escapement of coho salmon in 2009 was the lowest of years with recorded data (Figure 4; Appendix C1). Removal was earlier than in previous years and a low escapement count is expected due to counts not being made during peak coho salmon migration in September. Historically, based on data from years with complete coho salmon run assessment (2001 through 2007), cumulative percent passage shows approximately 6% of the run has occurred by 11 August (Figure 3). Median passage date historically occurs in late August and the central 50% of the run occurs between late August and early September.

The observed escapement of Dolly Varden in 2009 was the highest ever recorded at the weir. The previous high count of 15,674 fish occurred in 2002 (Lisac 2006). The proportion of spawning fish to non-spawning fish was not determined. It is important to determine the proportion of spawning fish because Dolly Varden are known to overwinter in aggregates of mixed stocks (DeCicco 1992; Whalen 1992) and comparing total run estimates at the weir can be misleading for long term monitoring efforts.

AGE, SEX, AND LENGTH COMPOSITION ESTIMATES

Trapping Chinook salmon for ASL sampling proved to be problematic. Chinook salmon were generally reluctant to enter the trap when other fish species were present or when the fyke doors on the trap were set. The majority of Chinook salmon sampled were captured from behind the weir by dip net to increase the number of samples collected. It is unclear what bias may have been introduced to the escapement ASL sample by using this capture method. Achieving minimum sampling goals for Chinook salmon in 2009 was the result of the crew actively targeting and using dip nets to capture fish. Historically, it has been problematic in most years to successfully achieve ASL sampling goals of 210 Chinook salmon each week for a minimum of 6 weeks. Sampling goals were changed in 2006 to bring the Kanektok River weir sampling goals in line with other escapement projects in the Kuskokwim Area.

Males dominated the Chinook salmon commercial harvest. The relatively high proportion of younger males in the commercial harvest is likely a function of commercial fisheries regulations that restrict commercial fisheries to gillnets with 6 inches or less, mesh (5 AAC 07.331d2). It is known that mesh of this size will catch a larger percentage of smaller, usually male, Chinook salmon than the true male to female proportion that exists in the population (Vania et al. 2002).

Chum and sockeye salmon ASL sampling objectives were met in 2009. Generally, salmon sex and age composition changes slightly over the course of the run. A late start of weir operations could bias any possible results toward late running fish and it is difficult to determine if the age and sex of late running fish are an accurate representation of overall migration. Chum and sockeye salmon sampling goals were also addressed and adjusted in line with sampling objectives from other assessment projects in the Kuskokwim Area. Obtaining 210 pulse samples at the onset and end of their respective runs can be difficult when weekly counts may be less than the sample objectives; however, adjusting sampling goals to at least one pulse from each third of

the run has alleviated problems encountered from low abundance of these species at the tails of their perspective runs. Capture with dip nets, along with active collection, produced adequate sampling in 2009.

CONCLUSIONS

The project has:

1. Demonstrated the ability to successfully install and operate a weir in Kanektok River to monitor Chinook, sockeye, and chum salmon escapements.
2. Shown the Kanektok River weir is not a viable project for estimating coho salmon escapement in years with August weir removal.
3. Demonstrated the ability to achieve adequate sample collection of Chinook, sockeye and chum salmon.
4. Provided escapement and run timing information for Kanektok River Chinook, sockeye, and chum salmon and Dolly Varden populations.
5. Provided a platform for possible collection and tagging of Dolly Varden migrating past the weir.

RECOMMENDATIONS

Establishing long-term funding for the project would ensure a long-term escapement, run timing, and ASL database required to better understand spawning populations and carrying capacity of the Kanektok River. A long-term database should lead to the establishment of biological escapement goals (BEG) for spawning salmon populations, improving management of spawning stocks for sustainable yields.

Implementing an inriver Chinook salmon radiotelemetry study would increase accuracy in determining total abundance of Chinook salmon spawning below the Kanektok River weir, which in turn increases accuracy of drainage escapement estimates. Radiotelemetry could also be used to compare and contrast distribution of salmon observed from aerial surveys with radiotelemetry results in order to ground truth aerial survey distribution estimates, which may be applied to historic aerial survey information to extend the data base for the Kanektok system. Such a study could be expanded in the future to examine the number of chum and sockeye salmon spawning below the weir in addition to their spawning distribution within the drainage.

Explore the feasibility of a sonar project on the lower Kanektok River. A sonar project may be able to produce a more accurate estimation of overall migration if placed at a location near the mouth. Data could be used to improve estimates of important subsistence and commercial species.

The cooperative effort between NVK, USFWS, and ADF&G should be continued, with ADF&G maintaining its proactive role in the mentoring of NVK technicians, the development of the project, and oversight of seasonal operation. Regular consultations between ADF&G, NVK, and USFWS occurred throughout the field season, coordinating logistics, discussing results, and exchanging ideas. NVK provided 3 technicians for the 2009 season.

USFWS has used the weir in the past as a platform for Dolly Varden population studies to better understand their spawning populations in Kanektok River. Dolly Varden length, sex and maturity

sampling, genetic sampling, and tagging have not been conducted since 2007. These sampling efforts should be re-initiated and continued in future years.

Every effort should be made to continue with annual weir installation in mid to late April to ensure the weir is operational by mid to late June. To the extent feasible, aerial monitoring and water level at the weir site should be monitored in mid April each year to facilitate early installation. Kanektok River has demonstrated high water level and water flow in May and June having the potential to substantially delay installation until July or later depending on the severity and duration of high water conditions. Weir removal should occur in mid to late August to avoid complications caused by late season high water conditions.

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TABLES AND FIGURES

Table 1.–Escapement and harvests summary for the Kanektok River drainage, 2009.

Escapement Estimates				
	Chinook	Sockeye	Chum	Coho
Weir Escapement	6,841	272,483	51,652	2,336
Drainage Aerial Survey [a]	7,487	173,977	[b]	[b]
Percentage Upstream of Weir [a]	47.6	93.3	[b]	[b]
Aerial Survey (SEG)	3,500–8,000	14,000–34,000	>5,200	7,700–36,000
Harvests Estimates				
	Chinook	Sockeye	Chum	Coho
District W-4 Commercial Harvest	13,920	112,153	91,158	48,115
Subsistence Harvest [c]	3,335	1,510	1,350	1,430
Sport Fishing Harvest [d]	609	328	138	1,394

[a] Average of aerial escapement surveys conducted in 2005, 2006 and 2008.

[b] No estimate made in 2009.

[c] Harvest estimates based on the 10 year (1998–2007) average.

[d] Harvest estimates based on the 10 year (1999–2008) average.

Table 2.–District W-4 commercial harvest by period and exvessel value, 2009.

	Date	Permits	Chinook		Sockeye		Chum		Coho	
Period	Caught	Fished	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds	Harvest	Pounds
1	6/15	79	1,608	18,072	142	1,002	231	1,722	0	0
2	6/17	73	1,878	21,489	245	1,832	183	1,422	0	0
3	6/22	110	3,482	41,138	1,892	13,845	2,005	15,610	0	0
4	6/25	120	2,849	38,399	4,753	32,959	3,931	30,043	0	0
5	6/30	122	1,302	19,276	10,329	70,272	7,391	54,316	0	0
6	7/6	120	723	11,607	14,406	94,040	6,171	44,526	0	0
7	7/8	131	798	13,358	12,919	81,012	10,633	75,024	0	0
8	7/10	122	382	6,274	14,274	87,409	11,026	78,732	2	14
9	7/13	95	133	2,615	7,810	48,203	7,256	51,308	0	0
10	7/15	111	137	2,510	8,623	51,853	6,323	43,392	3	20
11	7/16	77	72	1,271	7,021	41,451	4,635	32,809	4	35
12	7/17	80	135	2,482	6,561	38,047	6,732	46,148	3	25
13	7/20	70	92	1,772	6,877	39,674	4,557	31,182	110	858
14	7/22	73	81	1,460	6,898	39,045	4,710	31,562	211	1,518
15	7/24	79	74	1,091	4,048	23,163	4,268	28,319	548	3,750
16	7/25	61	42	778	1,960	10,887	3,794	25,536	610	4,300
17	7/27	41	27	525	837	4,475	1,868	12,665	618	4,385
18	7/29	19	3	43	134	768	284	1,927	209	1,515
19	7/31	38	17	305	847	4,705	2,240	14,939	2,289	17,227
20	8/3	53	22	377	470	2,813	866	5,582	3,733	28,043
21	8/5	56	8	161	245	1,409	639	4,044	4,254	33,175
22	8/7	69	11	274	239	1,512	562	3,587	4,952	39,879
23	8/10	70	8	160	235	1,470	374	2,417	4,572	37,495
24	8/12	58	4	68	92	578	169	1,080	4,076	33,132
25	8/14	64	8	85	131	807	146	974	5,973	48,965
26	8/17	66	9	140	96	612	99	682	5,507	46,354
27	8/19	66	4	48	77	499	66	427	5,181	44,574
28	8/21	56	5	98	51	333	31	227	3,930	33,429
29	8/24	45	6	64	16	105	24	179	1,330	11,485
Total		179	13,920	185,940	112,228	694,780	91,214	640,381	48,115	390,178
Average Weight				13.36		6.19		7.02		8.11
Average Price				0.7		0.55		0.15		0.35
Exvessel Value				$130,158		$382,129		$96,057		$136,562
Total Number of Fish			265,477							
Total Pounds			1,911,279							
Total Exvessel Value			$744,906							

[a] A breach occurred in the weir and daily passage was estimated.

Table 3.–Daily and cumulative Chinook, sockeye, chum, and coho salmon passage, Kanektok River weir, 2009.

	Chinook			Sockeye			Chum			Coho		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
07/05	36	36	1	10,756	10,756	4	1,230	1,230	2	0	0	0
07/06	41	77	1	15,151	25,907	10	1,368	2,598	5	0	0	0
07/07	122	199	3	16,820	42,727	16	1,967	4,565	9	0	0	0
07/08	56	255	4	11,143	53,870	20	1,629	6,194	12	0	0	0
07/09	10	265	4	11,777	65,647	24	866	7,060	14	0	0	0
07/10	48	313	5	12,057	77,704	29	1,521	8,581	17	0	0	0
07/11	226	539	8	16,403	94,107	35	2,503	11,084	21	0	0	0
07/12	259	798	12	14,105	108,212	40	4,171	15,255	30	0	0	0
07/13	245	1,043	15	16,895	125,107	46	3,036	18,291	35	0	0	0
07/14	142	1,185	17	12,787	137,894	**51**	1,619	19,910	39	0	0	0
07/15	183	1,368	20	16,124	154,018	57	1,409	21,319	41	0	0	0
07/16	237	1,605	23	15,760	169,778	62	2,339	23,658	46	0	0	0
07/17	311	1,916	28	15,407	185,185	68	3,584	27,242	**53**	3	3	0
07/18	309	2,225	33	12,912	198,097	73	2,624	29,866	58	3	6	0
07/19	365	2,590	38	10,054	208,151	76	2,266	32,132	62	3	9	0
07/20	441	3,031	44	7,979	216,130	79	1,972	34,104	66	5	14	1
07/21	307	3,338	49	6,266	222,396	82	1,522	35,626	69	10	24	1
07/22	253	3,591	**52**	7,426	229,822	84	1,640	37,266	72	5	29	1
07/23	382	3,973	58	7,010	236,832	87	1,242	38,508	75	12	41	2
07/24	440	4,413	65	5,479	242,311	89	914	39,422	76	13	54	2
07/25	294	4,707	69	4,426	246,737	91	673	40,095	78	3	57	2
07/26	243	4,950	72	3,326	250,063	92	367	40,462	78	14	71	3
07/27	175 [a]	5,125	75	3,639 [a]	253,702	93	435 [a]	40,897	79	28 [a]	99	4
07/28	176	5,301	77	2,423	256,125	94	297	41,194	80	31	130	6
07/29	326	5,627	82	2,034	258,159	95	401	41,595	81	23	153	7
07/30	182	5,809	85	1,652	259,811	95	702	42,297	82	43	196	8
07/31	105	5,914	86	1,227	261,038	96	677	42,974	83	62	258	11
08/01	85	5,999	88	971	262,009	96	362	43,336	84	50	308	13
08/02	194	6,193	91	2,132	264,141	97	1,822	45,158	87	56	364	16
08/03	144	6,337	93	1,583	265,724	98	781	45,939	89	110	474	20
08/04	243	6,580	96	1,307	267,031	98	1,251	47,190	91	156	630	27
08/05	61	6,641	97	1,128	268,159	98	919	48,109	93	212	842	36
08/06	57	6,698	98	1,107	269,266	99	757	48,866	95	213	1,055	45
08/07	35	6,733	98	932	270,198	99	689	49,555	96	199	1,254	**54**

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Table 3.–Page 2 of 2.

	Chinook			Sockeye			Chum			Coho		
Date	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage	Daily	Cum.	% passage
08/08	25	6,758	99	691	270,889	99	596	50,151	97	146	1,400	60
08/09	43	6,801	99	640	271,529	100	643	50,794	98	249	1,649	71
08/10	21	6,822	100	463	271,992	100	499	51,293	99	312	1,961	84
08/11	19	6,841	100	491	272,483	100	359	51,652	100	375	2,336	100
Total	6,841			272,483			51,652			2,336		
Observed	6,841			272,483			51,625			2,336		
Estimated	0			0			27			0		
% Observed	100.0			100.0			99.9			100.0		

Note: Outside boxes indicate the estimated central 50% of passage. Inside boxes indicate the date that the estimated cumulative 50% passage occurred.

[a] Daily passage was estimated due to the occurrence of a hole in the weir.

Table 4.–Daily and cumulative pink salmon, Dolly Varden, whitefish, and rainbow trout passage, Kanektok River weir, 2009.

	Pink Salmon		Dolly Varden		Whitefish		Rainbow Trout	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
07/05	12	12	1,050	1050	0	0	5	5
07/06	24	36	2,116	3,166	3	3	4	9
07/07	53	89	2,975	6,141	0	3	1	10
07/08	39	128	2,242	8,383	0	3	2	12
07/09	25	153	1,098	9,481	5	8	2	14
07/10	22	175	1,990	11,471	4	12	3	17
07/11	47	222	2,216	13,687	3	15	3	20
07/12	65	287	3,425	17,112	7	22	12	32
07/13	67	354	1,995	19,107	3	25	4	36
07/14	104	458	1,336	20,443	4	29	3	39
07/15	72	530	487	20,930	2	31	2	41
07/16	50	580	525	21,455	6	37	3	44
07/17	103	683	718	22,173	0	37	4	48
07/18	84	767	577	22,750	3	40	2	50
07/19	69	836	353	23,103	0	40	1	51
07/20	69	905	296	23,399	0	40	7	58
07/21	75	980	226	23,625	0	40	15	73
07/22	65	1,045	157	23,782	1	41	7	80
07/23	59	1,104	179	23,961	0	41	7	87
07/24	47	1,151	188	24,149	4	45	7	94
07/25	26	1,177	114	24,263	1	46	6	100
07/26	17	1,194	95	24,358	0	46	3	103
07/27	14 [a]	1,208	83 [a]	24,441	0 [a]	46	0 [a]	103
07/28	9	1,217	135	24,576	1	47	0	103
07/29	3	1,220	103	24,679	0	47	3	106
07/30	2	1,222	70	24,749	0	47	3	109
07/31	0	1,222	100	24,849	2	49	1	110
08/01	1	1,223	114	24,963	1	50	6	116
08/02	7	1,230	65	25,028	4	54	2	118
08/03	1	1,231	155	25,183	5	59	4	122
08/04	3	1,234	75	25,258	11	70	3	125
08/05	2	1,236	61	25,319	3	73	7	132
08/06	0	1,236	58	25,377	1	74	4	136
08/07	0	1,236	49	25,426	1	75	5	141

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Table 4.–Page 2 of 2.

	Pink Salmon		Dolly Varden		Whitefish		Rainbow Trout	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
08/08	2	1,238	70	25,496	1	76	0	141
08/09	4	1,242	66	25,562	3	79	9	150
08/10	2	1,244	219	25,781	0	79	0	150
08/11	2	1,246	275	26,056	2	81	0	150
Total	1,246		26,056		81		150	

[a] A breach occurred in the weir and daily passage was not estimated.

Table 5.–Age and sex composition of Chinook salmon escapement, Kanektok River weir, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc	1.1 %	1.2 Esc	1.2 %	2.2 Esc	2.2 %	1.3 Esc	1.3 %	1.4 Esc	1.4 %	1.5 Esc	1.5 %	2.4 Esc	2.4 %	Total Esc	Total %
7/5-18	164	146	M	15	0.7	579	26.0	15	0.7	533	24.0	305	13.7	0	0.0	0	0.0	1,448	65.1
(7/5-18)			F	0	0.0	0	0.0	0	0.0	92	4.1	686	30.8	0	0.0	0	0.0	777	34.9
			Subtotal	15	0.7	579	26.0	15	0.7	625	28.1	991	44.5	0	0.0	0	0.0	2,225	100.0
7/19-25	186	168	M	15	0.6	753	30.4	0	0.0	502	20.2	502	20.2	0	0.0	0	0.0	1,773	71.4
(7/19-25)			F	0	0.0	0	0.0	0	0.0	89	3.6	591	23.8	15	0.6	15	0.6	709	28.6
			Subtotal	15	0.6	753	30.4	0	0.0	591	23.8	1,093	44.0	15	0.6	15	0.6	2,482	100.0
7/26-8/2	220	154	M	0	0.0	457	21.4	0	0.0	277	13.0	333	15.6	0	0.0	0	0.0	1,067	50.0
(7/26-8/11)			F	0	0.0	0	0.0	0	0.0	97	4.5	970	45.4	0	0.0	0	0.0	1,067	50.0
			Subtotal	0	0.0	457	21.4	0	0.0	374	17.5	1,303	61.0	0	0.0	0	0.0	2,134	100.0
Season	570	468	M	30	0.4	1,790	26.2	15	0.2	1,313	19.2	1,139	16.7	0	0.0	0	0.0	4,288	62.7
			F	0	0.0	0	0.0	0	0.0	277	4.0	2,247	32.8	15	0.2	15	0.2	2,553	37.3
			Total	30	0.4	1,790	26.2	15	0.2	1,590	23.2	3,386	49.5	15	0.2	15	0.2	6,841	100.0
			95% C. I.		(± 0.6)		(± 3.9)		(± 3.7)		(± 3.7)		(± 4.3)		(± 0.6)		(± 0.6)		
			M	861	1.2	26,966	38.1	15	0.0	12,281	17.4	8,079	11.4	327	0.5	0	0.0	48,529	68.6
Grand		1,774	F	0	0.0	1,930	2.7	0	0.0	2,575	3.6	16,934	23.9	728	1.0	42	0.1	22,208	31.4
Total[a]			Total	861	1.2	28,896	40.8	15	0.0	14,856	21.0	24,013	33.9	1,055	1.5	42	0.1	70,737	100

[a] The number of fish in the "Grand Total" are the sum of historical "Season" totals, percentages are derived from those sums and includes the years 1997, 2002–2005, 2007, and 2009.

Table 6.–Mean length (mm) of Chinook salmon escapement, Kanektok River weir, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	1.5	2.4
7/5-18	M	Mean Length	400	543	578	705	821	-	-
(7/5-18)		Std. Error	-	8	-	7	21	-	-
		Range	400-400	430-631	578-578	574-821	591-1004	-	-
		Sample Size	1	38	1	35	20	0	0
	F	Mean Length	-	-	-	776	850	-	-
		Std. Error	-	-	-	34	8	-	-
		Range	-	-	-	629-876	755-1040	-	-
		Sample Size	0	0	0	6	45	0	0
7/19-25	M	Mean Length	491	572	-	697	796	-	-
(7/19-25)		Std. Error	-	8	-	12	10	-	-
		Range	491-491	457-760	-	590-861	675-934	-	-
		Sample Size	1	51	0	34	34	0	0
	F	Mean Length	-	-	-	820	868	924	877
		Std. Error	-	-	-	18	9	-	-
		Range	-	-	-	768-890	710-995	924-924	877-877
		Sample Size	0	0	0	6	40	1	1
7/26-8/2	M	Mean Length	-	581	-	704	814	-	-
(7/26-8/11)		Std. Error	-	9	-	16	14	-	-
		Range	-	461-675	-	573-834	710-940	-	-
		Sample Size	0	33	0	20	24	0	0
	F	Mean Length	-	-	-	813	860	-	-
		Std. Error	-	-	-	11	5	-	-
		Range	-	-	-	776-852	781-1005	-	-
		Sample Size	0	0	0	7	70	0	0
Season	M	Mean Length	445	565	578	702	808	-	-
		Range	400-491	430-760	578-578	573-861	591-1004	-	-
		Sample Size	2	122	1	89	78	0	0
	F	Mean Length	-	-	-	803	859	924	877
		Range	-	-	-	629-890	710-1040	924-924	877-877
		Sample Size	0	0	0	19	155	1	1

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Table 6.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	1.5	2.4
Grand Total [a]	M	Mean Length	416	542	578	691	828	841	-
		Range	370-491	411-760	578-578	505-861	578-1,004	759-945	-
		Sample Size	16	624	1	345	229	8	0
	F	Mean Length	-	600	-	765	847	884	839
		Range	-	480-640	-	714-890	631-1,040	770-980	800-877
		Sample Size	0	13	0	70	442	23	2

[a] The number of fish in the "Grand Total" are the sum of historical "Season" totals, percentages are derived from those sums and include 1997, 2002–2004, 2007, and 2009.

Table 7.–Age and sex composition of sockeye salmon escapement, Kanektok River weir, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc	0.2 %	0.3 Esc	0.3 %	1.2 Esc	1.2 %	0.4 Esc	0.4 %	1.3 Esc	1.3 %	2.2 Esc	2.2 %	1.4 Esc	1.4 %	2.3 Esc	2.3 %	Total Esc	Total %
7/5-10	250	207	M	0	0.0	375	0.5	22,147	28.5	0	0.0	19,145	24.7	375	0.5	0	0.0	376	0.5	42,418	54.6
(7/5-10)			F	0	0.0	1,502	1.9	18,394	23.7	0	0.0	15,015	19.3	0	0.0	0	0.0	375	0.5	35,286	45.4
			Subtotal	0	0.0	1,877	2.4	40,541	52.2	0	0.0	34,160	44.0	375	0.5	0	0.0	751	1.0	77,704	100.0
7/11-19	230	193	M	0	0.0	0	0.0	37,850	29.0	0	0.0	27,036	20.7	676	0.5	0	0.0	0	0.0	65,561	50.3
(7/11-19)			F	0	0.0	2,028	1.6	47,312	36.3	0	0.0	15,545	11.9	0	0.0	0	0.0	0	0.0	64,886	49.7
			Subtotal	0	0.0	2,028	1.6	85,162	65.3	0	0.0	42,581	32.6	676	0.5	0	0.0	0	0.0	130,447	100.0
7/25-26	220	185	M	0	0.0	1,043	1.6	12,171	18.9	0	0.0	10,084	15.7	0	0.0	348	0.5	0	0.0	23,646	36.8
(7/20-8/11)			F	0	0.0	348	0.6	31,297	48.7	0	0.0	8,346	12.9	0	0.0	0	0.0	695	1.1	40,686	63.2
			Subtotal	0	0.0	1,391	2.2	43,468	67.6	0	0.0	18,430	28.6	0	0.0	348	0.5	695	1.1	64,332	100.0
Season	700	585	M	0	0.0	1,419	0.5	72,168	26.5	0	0.0	56,265	20.6	1,051	0.4	348	0.1	375	0.1	131,626	48.3
			F	0	0.0	3,877	1.4	97,003	35.6	0	0.0	38,906	14.3	0	0.0	0	0.0	1,071	0.4	140,857	51.7
			Total	0	0.0	5,296	1.9	169,171	62.1	0	0.0	95,171	34.9	1,051	0.4	348	0.1	1,446	0.5	272,483	100.0
			95% C. I.				(± 4.0)		(± 4.0)				(± 4.0)		(± 4.0)		(± 0.6)		(± 0.6)		
Grand		3,654	M	541	0.1	12,166	1.3	215,142	22.3	1,684	0.2	271,029	28.1	3,549	0.4	9,858	1.0	7,603	0.8	521,719	54.0
Total[a]			F	1,290	0.1	7,889	0.8	233,233	24.2	2,333	0.2	181,731	18.8	2,304	0.2	6,331	0.7	7,836	0.8	443,556	46.0
			Total	1,831	0.2	20,055	2.1	448,375	46.5	4,017	0.4	452,760	46.9	5,853	0.6	16,189	1.7	15,439	1.6	965,275	100.0

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1997, 2002–2005, 2007, and 2009.

Table 8.–Mean length (mm) of sockeye salmon escapement, Kanektok River weir, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	1.3	2.2	1.4	2.3
7/5-10	M	Mean Length	-	603	537	578	499	-	587
(7/5-10)		Std. Error	-	-	3	5	-	-	-
		Range	-	603-603	490-651	426-642	499-499	-	587-587
		Sample Size	0	1	59	51	1	0	1
	F	Mean Length	-	568	510	544	-	-	543
		Std. Error	-	25	4	3	-	-	-
		Range	-	508-610	418-582	509-596	-	-	543-543
		Sample Size	0	4	49	40	0	0	1
7/11-19	M	Mean Length	-	-	536	583	579	-	-
(7/11-19)		Std. Error	-	-	2	4	-	-	-
		Range	-	-	474-576	522-635	579-579	-	-
		Sample Size	0	0	56	40	1	0	0
	F	Mean Length	-	541	511	544	-	-	-
		Std. Error	-	1	3	4	-	-	-
		Range	-	539-542	458-590	482-574	-	-	-
		Sample Size	0	3	70	23	0	0	0
7/25-26	M	Mean Length	-	580	538	587	-	643	-
(7/20-8/11)		Std. Error	-	14	5	7	-	-	-
		Range	-	554-604	490-595	510-679	-	643-643	-
		Sample Size	0	3	35	29	0	1	0
	F	Mean Length	-	578	507	547	-	-	516
		Std. Error	-	-	3	5	-	-	5
		Range	-	578-578	435-583	510-595	-	-	511-520
		Sample Size	0	1	90	24	0	0	2
Season	M	Mean Length	-	586	537	582	550	643	587
		Std. Error	-	554-604	474-651	426-679	499-579	643-643	587-587
		Sample Size	0	4	150	120	2	1	1
	F	Mean Length	-	555	509	545	-	-	525
		Range	-	508-610	418-590	482-596	-	-	511-543
		Sample Size	0	8	209	87	0	0	3

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Table 8.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	1.3	2.2	1.4	2.3
Grand Total [a]	M	Mean Length	575	591	529	580	540	596	564
		Range	553-589	487-666	398-600	445-660	536-540	501-645	515-630
		Sample Size	3	48	776	902	16	39	44
	F	Mean Length	504	543	501	545	496	567	535
		Range	473-552	500-582	424-606	455-616	477-517	520-600	494-590
		Sample Size	6	27	965	704	16	31	44

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included 1997, 2002–2004, 2007, and 2009.

Table 9.–Age and sex composition of chum salmon escapement, Kanektok River weir, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Esc	0.2 %	0.3 Esc	0.3 %	0.4 Esc	0.4 %	0.5 Esc	0.5 %	Total Esc	Total %
7/9-12	100	99	M	0	0.0	6,164	40.4	2,928	19.2	154	1.0	9,245	60.6
(7/5-12)			F	0	0.0	4,160	27.3	1,387	9.1	462	3.0	6,010	39.4
			Subtotal	0	0.0	10,324	67.7	4,315	28.3	616	4.0	15,255	100.0
7/13-19	180	189	M	199	1.1	7,380	39.1	4,189	22.2	100	0.5	11,868	63.0
(7/13-20)			F	0	0.0	5,086	27.0	1,895	10.1	0	0.0	6,981	37.0
			Subtotal	199	1.1	12,466	66.1	6,084	32.3	100	0.5	18,849	100.0
7/23-24	160	133	M	0	0.0	3,518	49.6	1,599	22.5	160	2.3	5,278	74.4
(7/21-28)			F	0	0.0	1,333	18.8	480	6.8	0	0.0	1,812	25.6
			Subtotal	0	0.0	4,851	68.4	2,079	29.3	160	2.3	7,090	100.0
7/29-31	220	210	M	50	0.5	4,681	44.7	1,843	17.6	149	1.4	6,723	64.3
(7/29-8/11)			F	50	0.5	2,789	26.7	846	8.1	50	0.5	3,735	35.7
			Subtotal	100	1.0	7,470	71.4	2,689	25.7	199	1.9	10,458	100.0
Season	660	631	M	249	0.5	21,743	42.1	10,558	20.5	563	1.1	33,114	64.1
			F	50	0.1	13,368	25.9	4,608	8.9	512	1.0	18,538	35.9
			Total	299	0.6	35,111	68.0	15,166	29.4	1,075	2.1	51,652	100.0
			95% C. I.		(± 0.6)		(± 4.0)		(± 3.9)		(± 1.3)		
			M	1,827	0.5	110,889	30.4	77,219	21.2	3,946	1.1	193,882	53.2
Grand		5,055	F	3,103	0.9	102,160	28.0	63,235	17.4	2,016	0.6	170,513	46.8
Total [a]			Total	4,930	1.4	213,049	58.5	140,454	38.5	5,962	1.6	364,395	100.0

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1997, 2002–2004, 2007, and 2009.

Table 10.–Mean length (mm) of chum salmon escapement, Kanektok River weir, 2009.

Sample Dates			Age Class			
(Stratum Dates)	Sex		0.2	0.3	0.4	0.5
7/9-12	M	Mean Length	-	602	601	650
(7/5-12)		Std. Error	-	5	7	-
		Range	-	543-666	534-659	650-650
		Sample Size	0	40	19	1
	F	Mean Length	-	568	580	553
		Std. Error	-	6	9	24
		Range	-	502-630	528-621	517-598
		Sample Size	0	27	9	3
7/13-19	M	Mean Length	557	592	618	618
(7/13-20)		Std. Error	15	3	5	-
		Range	542-572	510-687	529-682	618-618
		Sample Size	2	74	42	1
	F	Mean Length	-	562	568	-
		Std. Error	-	4	4	-
		Range	-	491-629	523-598	-
		Sample Size	0	51	19	0
7/23-24	M	Mean Length	-	607	627	587
(7/21-28)		Std. Error	-	3	6	12
		Range	-	540-650	572-708	570-610
		Sample Size	0	66	30	3
	F	Mean Length	-	575	602	-
		Std. Error	-	5	12	-
		Range	-	527-624	551-666	-
		Sample Size	0	25	9	0
7/29-31	M	Mean Length	554	592	618	598
(7/29-8/11)		Std. Error	-	3	3	22
		Range	554-554	530-650	581-670	558-635
		Sample Size	1	94	37	3
	F	Mean Length	528	567	575	535
		Std. Error	-	4	7	-
		Range	528-528	509-628	542-657	535-535
		Sample Size	1	56	17	1
Season	M	Mean Length	556	597	615	613
		Range	542-572	510-687	529-708	558-650
		Sample Size	3	274	128	8
	F	Mean Length	528	566	576	551
		Range	528-528	491-630	523-666	517-598
		Sample Size	1	159	54	4
Grand	M	Mean Length	553	584	604	611
Total [a]		Range	485-580	505-670	515-700	562-680
		Sample Size	34	1,470	1,130	50
	F	Mean Length	532	554	569	571
		Range	485-623	475-640	490-685	575-610
		Sample Size	58	1,411	876	26

[a] The numbers of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums. Years included are 1997, 2002–2004, 2007, and 2009.

Table 11.–Age and sex composition of coho salmon escapement, Kanektok River weir, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Esc	1.1 %	2.1 Esc	2.1 %	3.1 Esc	3.1 %	Total Esc	Total %
8/8-12	120	100	M	0	0.0	1,074	46.0	70	3.0	184	49.0
			F	47	2.0	1,051	45.0	93	4.0	191	51.0
			Subtotal	47	2.0	2,126	91.0	163	7.0	2,336	100.0
Season	120	100	M	0	0.0	1,074	46.0	70	3.0	184	49.0
			F	47	2.0	1,051	45.0	93	4.0	191	51.0
			Total	47	2.0	2,126	91.0	163	7.0	2,336	100.0
			95% C. I.		(± 2.7)		(± 5.5)		(± 4.9)		
Grand		1,794	M	5,833	2.3	111,323	44.3	8,566	3.4	125,721	50.0
Total[a]			F	2,856	1.1	111,507	44.4	11,197	4.5	125,559	50.0
			Total	8,689	3.5	222,830	88.7	19,763	7.9	251,280	100.0

[a] The number of fish in the "Grand Total" are the sum of historical "Season" totals. Percentages are derived from those sums and based on the years 1997, 2002–2005, 2007, and 2009.

Table 12.–Mean length (mm) of coho salmon escapement, Kanektok River weir, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/8-12	M	Mean Length	-	582	594
		Range	-	491-648	556-631
		Sample Size	0	46	3
	F	Mean Length	523	589	595
		Range	521-525	504-659	575-622
		Sample Size	2	45	4
Season	M	Mean Length	-	582	594
		Range	-	491-648	556-631
		Sample Size	0	46	3
	F	Mean Length	523	589	595
		Range	521-525	504-659	575-622
		Sample Size	2	45	4
Grand Total [a]	M	Mean Length	574	573	579
		Range	465-657	395-678	440-665
		Sample Size	74	820	57
	F	Mean Length	542	578	576
		Range	430-620	475-670	545-649
		Sample Size	29	744	70

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included are 1997, 2002–2005, 2007, and 2009.

Table 13.–Age and sex composition of Chinook salmon from the District W-4 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	%	1.2 Catch	%	2.2 Catch	%	1.3 Catch	%	1.4 Catch	%	2.3 Catch	%	1.5 Catch	%	2.4 Catch	%	Total Catch	%
6/15		202	M	103	1.5	3,794	54.5	34	0.5	1,656	23.7	621	8.9	0	0.0	0	0.0	0	0.0	6,209	89.1
(6/15-22)			F	0	0.0	0	0.0	0	0.0	103	1.5	655	9.4	0	0.0	0	0.0	0	0.0	759	10.9
			Subtotal	103	1.5	3,794	54.5	34	0.5	1,759	25.2	1,276	18.3	0	0.0	0	0.0	0	0.0	6,968	100.0
6/25		179	M	93	2.2	1,623	39.1	0	0.0	1,067	25.7	487	11.7	0	0.0	46	1.1	0	0.0	3,316	79.9
(6/25-30)			F	0	0.0	23	0.6	0	0.0	162	3.9	649	15.7	0	0.0	0	0.0	0	0.0	835	20.1
			Subtotal	93	2.2	1,646	39.7	0	0.0	1,229	29.6	1,136	27.4	0	0.0	46	1.1	0	0.0	4,151	100.0
7/6		186	M	15	0.5	738	26.4	30	1.1	678	24.2	452	16.1	15	0.5	15	0.5	0	0.0	1,943	69.4
(7/6-8/24)			F	0	0.0	15	0.5	0	0.0	75	2.7	753	26.9	0	0.0	0	0.0	15	0.5	858	30.6
			Subtotal	15	0.5	753	26.9	30	1.1	753	26.9	1,205	43.0	15	0.5	15	0.5	15	0.5	2,801	100.0
Season		567	M	211	1.5	6,156	44.2	65	0.5	3,400	24.4	1,559	11.2	15	0.1	61	0.4	0	0.0	11,468	82.4
			F	0	0.0	38	0.3	0	0.0	341	2.5	2,058	14.8	0	0.0	0	0.0	15	0.1	2,452	17.6
			Total	211	1.5	6,194	44.5	65	0.5	3,741	26.9	3,617	26.0	15	0.1	61	0.4	15	0.1	13,920	100.0
			95% C. I.		(± 1.1)		(± 4.2)		(± 3.8)		(± 3.8)				(± 3.5)		(± 0.2)		(± 0.5)		(± 0.5)
Grand		17,200	M	4,959	0.7	162,269	22.9	241	0.0	159,337	22.5	129,046	18.2	542	0.1	11,094	1.6	499	0.1	468,246	66.1
Total [a]			F	524	0.1	19,417	2.7	19	0.0	40,659	5.7	161,301	22.8	296	0.0	17,749	2.5	314	0.0	240,441	33.9
			Total	5,483	0.8	181,686	25.6	260	0.0	199,996	28.2	290,347	41.0	838	0.1	28,843	4.1	813	0.1	708,687	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; errors. The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums.

Table 14.–Mean length (mm) of Chinook salmon from the District W-4 commercial fishery, 2009.

Sample Dates			Age Class							
(Stratum Dates)	Sex		1.1	1.2	2.2	1.3	1.4	2.3	1.5	2.4
6/15	M	Mean Length	345	535	640	651	767	-	-	-
(6/15-22)		Std. Error	3	5	-	10	19	-	-	-
		Range	340-350	305-681	640-640	509-802	610-898	-	-	-
		Sample Size	3	110	1	48	18	0	0	0
	F	Mean Length	-	-	-	807	836	-	-	-
		Std. Error	-	-	-	8	15	-	-	-
		Range	-	-	-	791-817	712-996	-	-	-
		Sample Size	0	0	0	3	19	0	0	0
6/25	M	Mean Length	359	539	-	673	801	-	778	-
(6/25-30)		Std. Error	16	6	-	11	24	-	28	-
		Range	331-402	398-629	-	528-834	491-1005	-	750-805	-
		Sample Size	4	70	0	46	21	0	2	0
	F	Mean Length	-	558	-	768	830	-	-	-
		Std. Error	-	-	-	25	9	-	-	-
		Range	-	558-558	-	630-821	726-932	-	-	-
		Sample Size	0	1	0	7	28	0	0	0
7/6	M	Mean Length	334	562	540	687	791	680	904	-
(7/6-8/24)		Std. Error	-	8	47	10	12	-	-	-
		Range	334-334	385-642	493-587	572-836	690-905	680-680	904-904	-
		Sample Size	1	49	2	45	30	1	1	0
	F	Mean Length	-	635	-	800	841	-	-	818
		Std. Error	-	-	-	11	7	-	-	-
		Range	-	635-635	-	760-819	733-956	-	-	818-818
		Sample Size	0	1	0	5	50	0	0	1

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Table 14.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	1.2	2.2	1.3	1.4	2.3	1.5	2.4
Season	M	Mean Length	350	539	593	665	785	680	809	-
		Range	331-402	305-681	493-640	509-836	491-1,005	680-680	750-904	-
		Sample Size	-	229	3	139	69	1	3	0
	F	Mean Length	-	588	-	787	836	-	-	818
		Range	-	558-635	-	630-821	712-996	-	-	818-818
		Sample Size	0	2	0	15	97	0	0	1
Grand Total[a]	M	Mean Length	395	542	557	696	839	711	906	835
		Range	314-560	305-1,018	493-640	454-971	375-1,405	520-780	525-1,082	736-1,001
		Sample Size	136	3,520	8	3,616	2,676	10	199	10
	F	Mean Length	561	611	535	767	857	798	900	835
		Range	365-832	445-970	535-535	531-963	599-1,102	690-893	591-1,066	870-892
		Sample Size	6	371	1	904	3,382	6	331	6

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included averages are 1991-1995, 1997–2007, and 2009.

Table 15.–Age and sex composition of sockeye salmon from the District W-4 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	%	0.3 Catch	%	1.2 Catch	%	0.4 Catch	%	1.3 Catch	%	2.2 Catch	%	1.4 Catch	%	2.3 Catch	%	Total Catch	%
6/25		213	M	0	0.0	264	3.8	1,651	23.5	0	0.0	1,486	21.1	0	0.0	66	0.9	33	0.5	3,499	49.8
(6/15-25)			F	0	0.0	330	4.7	594	8.4	99	1.4	2,344	33.4	0	0.0	165	2.4	0	0.0	3,533	50.2
			Subtotal	0	0.0	594	8.5	2,245	31.9	99	1.4	3,830	54.5	0	0.0	231	3.3	33	0.5	7,032	100.0
7/6		208	M	0	0.0	357	1.4	5,827	23.5	0	0.0	3,924	15.9	0	0.0	357	1.4	357	1.5	10,822	43.8
(6/30-7/6)			F	0	0.0	594	2.4	6,303	25.5	0	0.0	6,422	25.9	0	0.0	238	1.0	357	1.4	13,913	56.2
			Subtotal	0	0.0	951	3.8	12,130	49.0	0	0.0	10,346	41.8	0	0.0	595	2.4	714	2.9	24,735	100.0
7/8		190	M	0	0.0	204	1.6	3,672	28.4	0	0.0	1,564	12.1	204	1.6	68	0.5	0	0.0	5,712	44.2
(7/8)			F	0	0.0	68	0.5	4,351	33.7	68	0.5	2,448	19	0	0.0	272	2.1	0	0.0	7,207	55.8
			Subtotal	0	0.0	272	2.1	8,023	62.1	68	0.5	4,012	31.1	204	1.6	340	2.6	0	0.0	12,919	100.0
7/10		185	M	0	0.0	77	0.5	4,629	32.5	0	0.0	2,469	17.3	77	0.5	0	0.0	0	0.0	7,253	50.8
(7/10)			F	0	0.0	154	1.1	3,472	24.3	0	0.0	3,163	22.2	0	0.0	231	1.6	0	0.0	7,021	49.2
			Subtotal	0	0.0	231	1.6	8,101	56.8	0	0.0	5,632	39.5	77	0.5	231	1.6	0	0.0	14,274	100.0
7/13		180	M	0	0.0	296	0.6	15,958	30.0	0	0.0	9,457	17.8	296	0.6	296	0.6	591	1.1	26,892	50.6
(7/13-8/24)			F	0	0.0	295	0.5	13,889	26.1	0	0.0	12,116	22.8	0	0.0	0	0.0	0	0.0	26,301	49.4
			Subtotal	0	0.0	591	1.1	29,847	56.1	0	0.0	21,573	40.6	296	0.6	296	0.6	591	1.1	53,193	100.0
Season		976	M	0	0.0	1,197	1.1	31,737	28.3	0	0.0	18899	16.9	577	0.5	786	0.7	981	0.9	54,177	48.3
			F	0	0.0	1,443	1.3	28,610	25.5	167	0.1	26,493	24	0	0.0	907	0.8	357	0.3	57,976	51.7
			Total	0	0.0	2,640	2.4	60,347	53.8	167	0.1	45,392	40.5	577	0.5	1,693	1.5	1338	1.2	112,153	100.0
			95% C. I.				(± 3.9)		(± 3.9)		(± 3.9)		(± 3.9)		(± 3.9)		(± 1.2)		(± 1.2)		
Grand		11,375	M	1,948	0.2	20,857	1.8	198,012	17.1	2,935	0.3	360,781	31.2	7,073	0.6	14,756	1.3	10,030	0.9	616,562	53.3
Total [a]			F	383	0.0	23,439	2.0	156,840	13.6	2,420	0.2	330,129	28.5	5,320	0.5	11,603	1.0	10,227	0.9	540,614	46.7
			Total	2,336	0.2	44,296	3.8	354,852	30.7	5,355	0.5	690,906	59.7	12,390	1.1	26,358	2.3	20,258	1.8	1,157,207	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; errors. The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums.

Table 16.–Mean length (mm) of sockeye salmon from the District W-4 commercial fishery, 2009.

Sample Dates			Age Class							
(Stratum Dates)	Sex		0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3
6/25	M	Mean Length	-	567	532	-	578	-	598	566
(6/15-25)		Std. Error	-	13	3	-	3	-	11	-
		Range	-	494-608	498-578	-	512-613	-	587-608	566-566
		Sample Size	0	8	50	0	45	0	2	1
	F	Mean Length	-	551	513	586	548	-	554	-
		Std. Error	-	6	4	9	2	-	12	-
		Range	-	527-592	480-545	570-601	502-580	-	520-587	-
		Sample Size	0	10	18	3	71	0	5	0
7/6	M	Mean Length	-	567	522	-	574	-	599	570
(6/30-7/6)		Std. Error	-	14	4	-	4	-	15	17
		Range	-	544-591	456-566	-	531-615	-	579-629	536-589
		Sample Size	0	3	49	0	33	0	3	3
	F	Mean Length	-	571	507	-	536	-	599	534
		Std. Error	-	17	3	-	2	-	29	10
		Range	-	541-633	444-563	-	503-566	-	570-628	522-554
		Sample Size	0	5	53	0	54	0	2	3
7/8	M	Mean Length	-	557	522	-	571	549	563	-
(7/8)		Std. Error	-	15	4	-	5	17	-	-
		Range	-	536-586	426-581	-	512-606	529-583	563-563	-
		Sample Size	0	3	54	0	23	3	1	0
	F	Mean Length	-	540	505	519	537	-	561	-
		Std. Error	-	-	3	-	4	-	12	-
		Range	-	540-540	454-597	519-519	487-592	-	534-591	-
		Sample Size	0	1	64	1	36	0	4	0

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Table 16.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	1.2	0.4	1.3	2.2	1.4	2.3
7/13	M	Mean Length	-	531	539	-	578	547	660	549
(7/13-8/24)		Std. Error	-	-	3	-	5	-	-	21
		Range	-	531-531	498-592	-	505-627	547-547	660-660	528-569
		Sample Size	0	1	54	0	32	1	1	2
	F	Mean Length	-	566	516	-	547	-	-	-
		Std. Error	-	-	3	-	3	-	-	-
		Range	-	566- 566	472- 566	-	503- 583	-	-	-
		Sample Size	0	1	47	0	41	0	0	0
Season	M	Mean Length	-	558	532	-	575	543	619	557
		Range	-	494-608	426-594	-	460-627	516-583	563-660	528-589
		Sample Size	0	16	267	0	165	5	7	6
	F	Mean Length	-	562	512	559	543	-	562	534
		Range	-	527-633	439-597	519-601	432-606	-	520-628	522-554
		Sample Size	0	19	227	4	243	0	14	3
Grand	M	Mean Length	461	568	520	590	575	534	591	570
Total [a]		Range	410-507	511-656	321-596	567-648	305-700	482-602	484-688	497-664
		Sample Size	12	101	1,637	15	3230	77	136	149
	F	Mean Length	499	545	503	568	544	505	561	546
		Range	480-502	474-623	407-590	519-607	323-625	463-563	504-631	483-610
		Sample Size	4	143	1,406	34	2997	65	137	126

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included averages are 1991-1995, 1997–2007, and 2009.

Table 17.–Age and sex composition of chum salmon from the District W-4 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 0.2 Catch	0.2 %	0.3 Catch	0.3 %	0.4 Catch	0.4 %	0.5 Catch	0.5 %	Total Catch	Total %
6/25		239	M	53	0.8	2,391	37.6	1,435	22.6	106	1.7	3,985	62.8
(6/15-25)			F	0	0.0	1,568	24.7	797	12.5	0	0.0	2,365	37.2
			Subtotal	53	0.8	3,959	62.3	2,232	35.1	106	1.7	6,350	100.0
7/6		217	M	250	1.8	2,437	18.0	3,250	24.0	250	1.9	6,187	45.6
(6/30-7/6)			F	375	2.8	3,875	28.5	3,000	22.1	125	0.9	7,375	54.4
			Subtotal	625	4.6	6,312	46.5	6,250	46.1	375	2.8	13,562	100.0
7/8		214	M	50	0.5	2,932	27.6	1,789	16.8	50	0.5	4,820	45.3
(7/8)			F	99	0.9	4,074	38.3	1,590	15.0	49	0.4	5,813	54.7
			Subtotal	149	1.4	7,006	65.9	3,379	31.8	99	0.9	10,633	100.0
7/10		220	M	150	1.4	3,508	31.8	1,704	15.5	100	0.9	5,463	49.5
(7/10)			F	201	1.8	3,609	32.7	1,704	15.4	50	0.5	5,563	50.5
			Subtotal	351	3.2	7,117	64.5	3,408	30.9	150	1.4	11,026	100.0
7/13		211	M	940	1.9	14,571	29.4	4,700	9.5	0	0.0	20,211	40.8
(7/13-8/24)			F	235	0.5	24,206	48.8	4,700	9.5	235	0.5	29,376	59.2
			Subtotal	1,175	2.4	38,777	78.2	9,400	19.0	235	0.5	49,587	100.0
Season		1,101	M	1,443	1.6	25,839	28.3	12,878	14.1	506	0.6	40,666	44.6
			F	910	1.0	37,331	41.0	11,791	13.0	460	0.5	50,492	55.4
			Total	2,353	2.6	63,170	69.3	24,669	27.1	966	1.1	91,158	100.0
			95% C. I.		(± 1.2)		(± 3.4)		(± 3.2)		(± 0.6)		
Grand		15,957	M	7,911	0.8	255,399	26.0	177,501	18.1	6,659	0.7	447,471	45.6
Total[a]			F	8,685	0.9	325,712	33.2	192,151	19.6	7,676	0.8	534,222	54.4
			Total	16,596	1.691	581,112	59.2	369,651	37.65	14,335	1.46	981,680	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums.

Table 18.–Mean length (mm) of chum salmon from the District W-4 commercial fishery, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
6/25	M	Mean Length	574	595	612	595
(6/15-25)		Std. Error	4	3	4	15
		Range	570-578	506-654	564-689	554-623
		Sample Size	2	90	54	4
	F	Mean Length	-	576	583	-
		Std. Error	-	3	4	-
		Range	-	530-620	545-624	-
		Sample Size	0	59	30	0
7/6	M	Mean Length	578	576	592	582
(6/30-7/6)		Std. Error	14	4	3	23
		Range	537-603	514-638	537-637	527-637
		Sample Size	4	39	52	4
	F	Mean Length	576	555	565	584
		Std. Error	29	3	3	26
		Range	534-717	515-600	529-608	558-609
		Sample Size	6	62	48	2
7/8	M	Mean Length	575	586	597	604
(7/8)		Std. Error	-	3	4	-
		Range	575-575	501-644	540-678	604-604
		Sample Size	1	59	36	1
	F	Mean Length	558	558	570	596
		Std. Error	33	3	4	-
		Range	525-590	506-604	528-614	596-596
		Sample Size	2	82	32	1
7/10	M	Mean Length	526	581	591	623
(7/10)		Std. Error	8	3	5	24
		Range	514-540	515-632	530-650	599-646
		Sample Size	3	70	34	2
	F	Mean Length	537	563	572	594
		Std. Error	8	3	4	-
		Range	516-555	509-613	521-630	594-594
		Sample Size	4	72	34	1
7/13	M	Mean Length	521	588	585	-
(7/13-8/24)		Std. Error	11	4	5	-
		Range	490-542	537-672	546-636	-
		Sample Size	4	62	20	0
	F	Mean Length	545	556	553	550
		Std. Error	-	3	5	-
		Range	545-545	500-641	510-594	550-550
		Sample Size	1	103	20	1

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Table 18.–Page 2 of 2.

Sample Dates (Stratum Dates)	Sex		Age Class 0.2	0.3	0.4	0.5
Season	M	Mean Length	535	586	592	595
		Range	490-603	501-672	530-689	527-646
		Sample Size	14	320	196	11
	F	Mean Length	557	558	563	569
		Range	516-717	500-641	510-630	550-609
		Sample Size	13	378	164	5
Grand	M	Mean Length	534	582	603	604
Total [a]		Range	454-675	462-710	492-735	527- 694
		Sample Size	133	4,294	2,910	109
	F	Mean Length	532	559	576	583
		Range	486-717	325-683	492-695	516-651
		Sample Size	164	5,169	3,068	105

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included averages are 1991-1995, 1997–2007, and 2009.

Table 19.–Age and sex of coho salmon from the District W-4 commercial fishery, 2009.

Sample Dates (Stratum)	Pulse Sample Size	Aged Sample Size	Sex	Age Class 1.1 Catch	1.1 %	2.1 Catch	2.1 %	3.1 Catch	3.1 %	Total Catch	Total %
8/5		198	M	729	1.5	24,301	50.5	1,701	3.5	26,731	55.6
(6/15-8/24)			F	243	0.5	18,954	39.4	2,187	4.6	21,384	44.4
			Subtotal	972	2.0	43,255	89.9	3,888	8.1	48,115	100.0
Season		198	M	729	1.5	24,301	50.5	1,701	3.5	26,731	55.6
			F	243	0.5	18,954	39.4	2,187	4.6	21,384	44.4
			Total	972	2.0	43,255	89.9	3,888	8.1	48,115	100.0
			95% C. I.		(± 2.0)		(± 4.2)		(± 3.8)		
Grand		7,875	M	38,541	4.2	394,402	43.5	18,433	2.0	484,389	53.4
Total [a]			F	32,269	3.6	340,608	37.5	17,555	1.9	423,139	46.6
			Total	70,809	7.8	735,010	81.0	35,987	4.0	907,539	100.0

Note: The number of fish in each stratum age and sex category are derived from the sample percentages; discrepancies are attributed to rounding errors. The number of fish in "Season" summaries are the strata sums; "Season" percentages are derived from the sums.

[a] The number of fish in the "Grand total" are the sum of historical "Season" totals; percentages are derived from those sums.

Table 20.–Mean length (mm) of coho salmon from the District W-4 commercial fishery, 2009.

Sample Dates (Stratum Dates)	Sex		Age Class 1.1	2.1	3.1
8/5	M	Mean Length	578	560	561
(6/15-8/24)		Range	513-637	399-657	501-638
		Sample Size	3	100	7
	F	Mean Length	564	578	573
		Range	564-564	508-629	499-638
		Sample Size	1	78	9
Season	M	Mean Length	578	560	561
		Range	513-637	399-657	501-638
		Sample Size	3	100	7
	F	Mean Length	564	578	573
		Range	564-564	508-629	499-638
		Sample Size	1	78	9
Grand	M	Mean Length	557	579	583
Total [a]		Range	472-653	399-704	489-660
		Sample Size	193	1,915	87
	F	Mean Length	579	583	576
		Range	441-661	412-696	499-620
		Sample Size	132	1,637	79

[a] "Grand Total" mean lengths are simple averages of historical "Season" mean lengths. Years included averages are 1991-1995, 1997–2007, and 2009.

Table 21.–Daily weather and hydrological observations from the Kanektok River weir site, 2009.

Date	Wind (Dir/ Speed)	Precip (in)	Air Temp. (C)	Water Temp. (C)	Cloud Cover % / altitude	Water level (cm)
21 Jun	N/2	0.30	12	8	100/1000	31
22 Jun	E/7.6	0.20	13	9	90/1800	35
23 Jun	SE/3.1	0.02	10	9	90/1500	32
24 Jun	S/1	0.18	10	8	100/1500	33
25 Jun	SE/5.1	0.28	9.9	7	100/1100	30
26 Jun	NW/5	0.01	18.8	9	60/2500	29
27 Jun	NW/4.6	0.00	16.1	8	80/2500	25
28 Jun	NW/5.6	0.00	16	8	90/2000	25
29 Jun	W/5.5	0.00	19	11	50/2000	25
30 Jun	SE/6	0.00	24.3	10	65/2000	24
1 Jul	E/6	0.00	26.8	11	5/2800	24
2 Jul	E/7.8	0.00	25.1	11	5/5000	23
3 Jul	SE/30	0.00	17	9	95/1400	26
4 Jul	SW/3.5	0.30	25.4	11.5	50/2000	26
5 Jul	SE/6.4	0.00	24.3	11	90/1600	25
6 Jul	S/7.3	0.00	30.4	13	5/2500	24
7 Jul	W/4	0.00	15.8	10	100/1500	23
8 Jul	W/3.2	0.00	11.7	10	100/2000	21
9 Jul	W/6.2	0.00	25.5	13	2/6000	21
10 Jul	W/3.5	0.00	29.4	13	25/3000	19.5
11 Jul	W/4.6	0.00	28.5	14	5/2000	17
12 Jul	SE/7.6	0.00	30.5	14	50/2000	16
13 Jul	SE/7.6	0.00	15.6	12	100/1300	15
14 Jul	CALM	0.28	16.2	9	100/700	19
15 Jul	SE/6	0.16	14.4	9	100/800	18
16 Jul	SE/7.6	0.02	23.4	13	50/2000	16
17 Jul	S/5.3	0.22	13.5	10	100/1000	16.5
18 Jul	SE/4	0.08	12.4	10	100/1000	16.5
19 Jul	SE/4.9	0.30	14.8	9	90/1200	16.5
20 Jul	E/9.6	0.01	16.3	8	50/1100	16.5
21 Jul	SE/8.5	0.00	18.1	10	90/5000	14.5
22 Jul	E/10.5	0.00	19.6	11	97/4000	13
23 Jul	SE/3.8	0.00	16.1	11	90/2000	11
24 Jul	SE/7.8	0.02	16.9	11	100/1200	11.5
25 Jul	N/6	0.10	16.3	10	100/1300	13
26 Jul	E/5.5	0.15	14.6	9	100/1000	14
27 Jul	SE/7.6	0.03	14.1	10	100/500	15
28 Jul	NE/4.6	0.08	17.7	10	99/1500	21.5
29 Jul	SE/12	0.41	8.9	10	100/500	30.5
30 Jul	N/5.8	0.03	10.3	9	100/1000	36.5
31 Jul	SE/6.9	0.14	10.8	9	98/1100	36
1 Aug	SE/5.1	0.07	10	10	100/1100	36.5

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Table 21.–Page 2 of 2.

Date	Wind (Dir/ Speed)	Precip (in)	Air Temp. (C)	Water Temp. (C)	Cloud Cover % / altitude	Water level (cm)
2 Aug	SE/10.7	0.03	11.8	9	100/1300	34.5
3 Aug	E/9.3	0.02	17.4	9	60/5000	33
4 Aug	SE/9.8	0.06	15.1	10	100/1100	34.5
5 Aug	E/4.9	0.08	19	9	65/1500	32
6 Aug	E/8.2	0.01	20.9	11	20/2000	30
7 Aug	CALM	0.00	20.9	10.5	90/2000	29
8 Aug	N/9.3	0.00	17.1	11	100/1000	26
9 Aug	NW/9.1	0.00	22.8	12	50/1150	24
10 Aug	W/5.5	0.00	21.9	11.5	50/5000	22.5
11 Aug	SW/3.3	0.00	28	12.5	30/5000	20
12 Aug	S/10.9	0.00	11.6	10.5	90/1000	18
13 Aug	E/4.6	0.12	12.1	10	100/1000	14
14 Aug	SE/2.6	0.02	17.1	10	100/1200	14
15 Aug	S/4.9	0.10	16.1	11	90/800	10
16 Aug	SE/3.2	0.03	16.8	11	80/1100	10.5
17 Aug	E/7.3	0.00	21.4	12	40/1300	8.5
18 Aug	SE/7.5	0.00	12.2	10.5	100/800	7.5
19 Aug	NE/2.9	0.00	16.5	12.5	75/1300	6
20 Aug	SW/6.3	0.03	15.2	11.5	100/800	5.5
21 Aug	SE/7.8	0.12	14.3	12	100/1100	4.5
22 Aug	SE/6.4	0.14	15.3	10	80/1100	5
23 Aug	NW/4.2	0.16	11.4	9.5	95/1200	6.5
24 Aug	N/.6	0.05	16.5	8	95/900	5.5
25 Aug	S/11.4	0.15	15.3	9.5	70/1200	6
26 Aug	E/2.4	0.00	21.8	9.5	85/4000	4.5
27 Aug	SW/3.3	0.02	14.7	9.5	80/900	4.5
28 Aug	NE/2.8	0.00	13.8	9	90/1200	2
29 Aug	N/A	0.00	12	9	100/1000	0

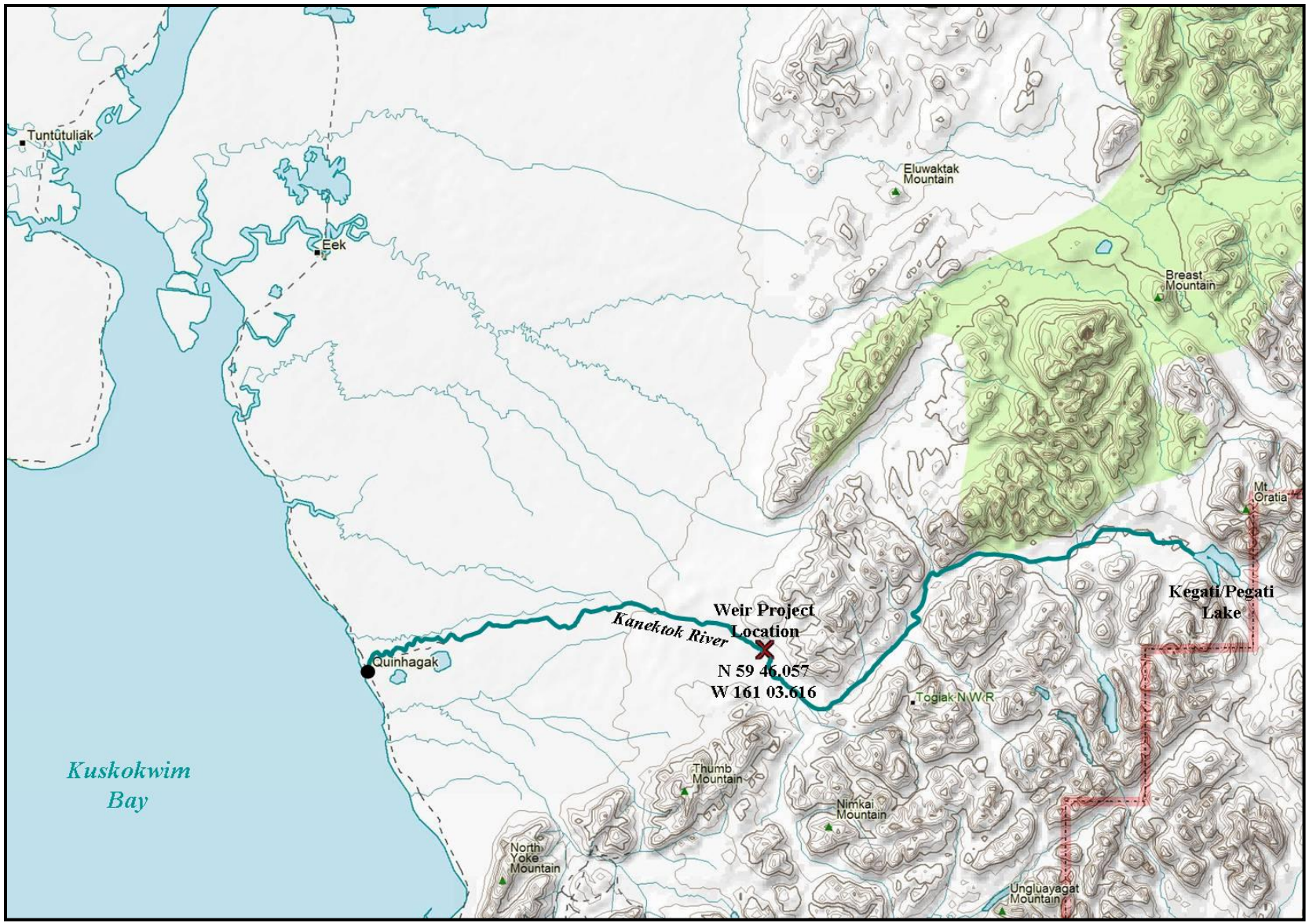
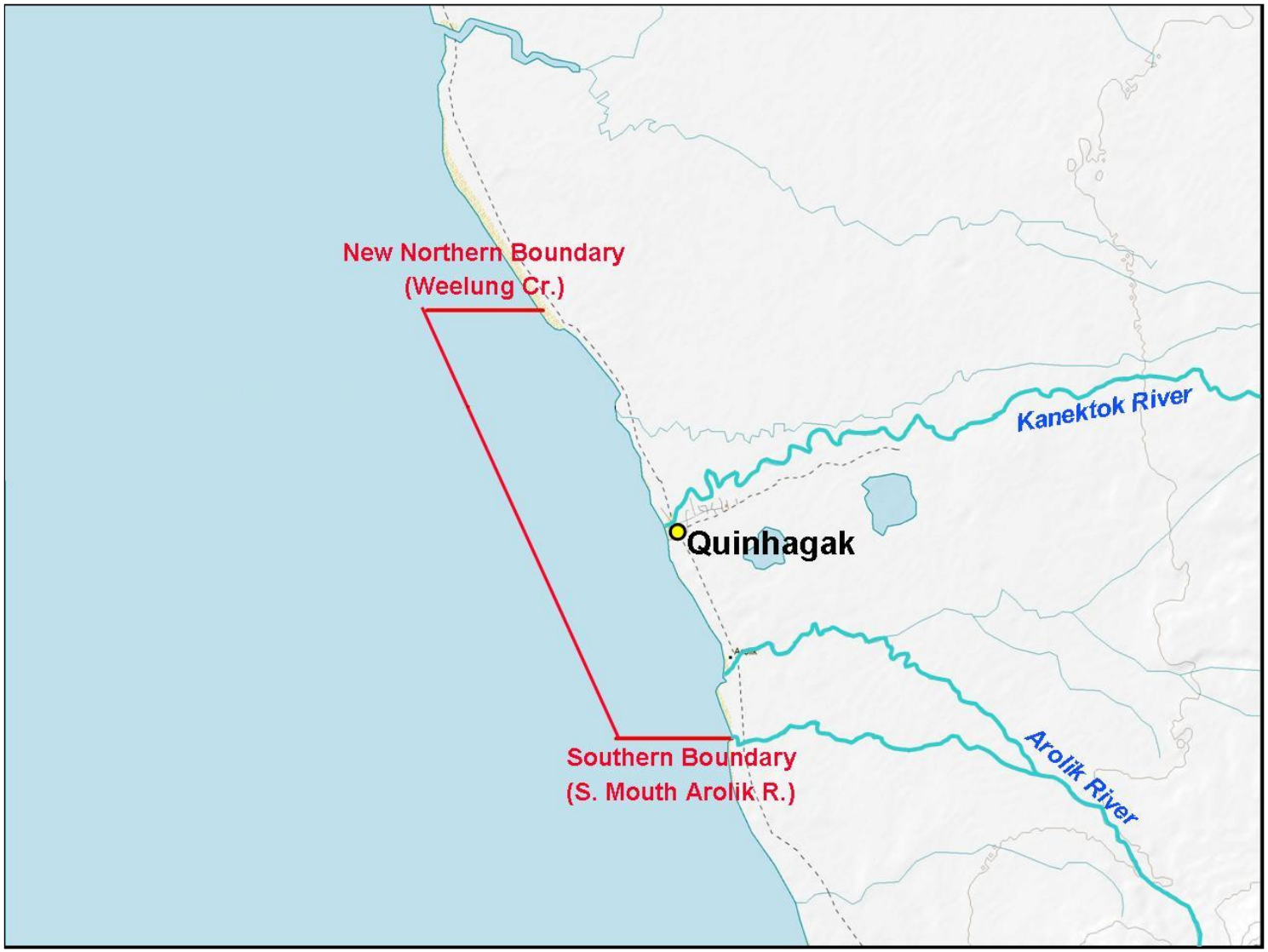
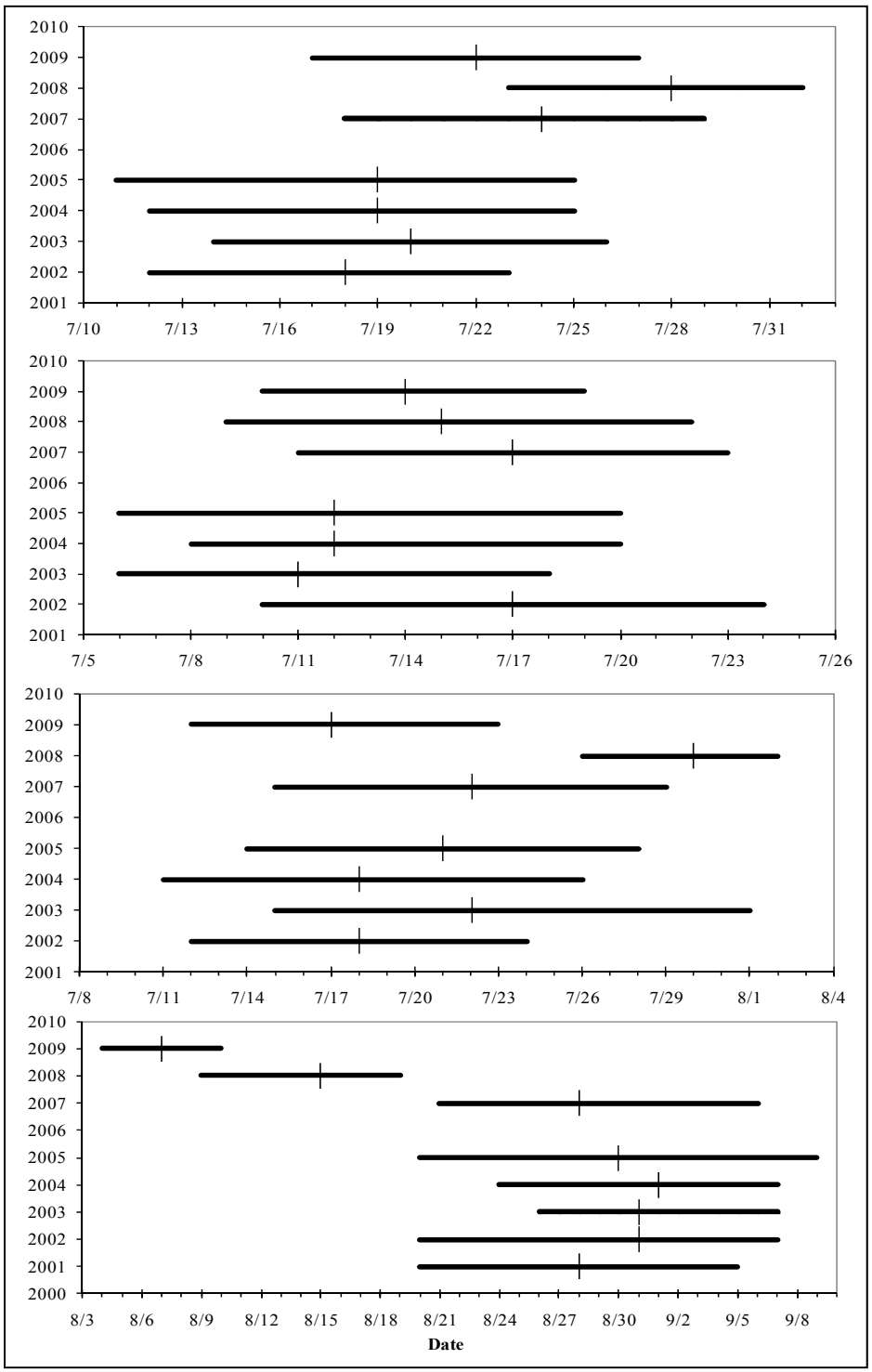


Figure 1.–Kanektok River, Kuskokwim Bay, Alaska.



Note: Solid lines represent the dates when the central 50% of the run passed and cross-bars represent the median passage date.

Figure 2.–Commercial Fishing District W-4, Kuskokwim Bay, Alaska, 2009.



Note: Annual run timing of Chinook, sockeye, chum, and coho salmon based on cumulative percent passage at the Kanektok River weir, 2001–2009.

Figure 3.–Historical escapement of Chinook, sockeye, chum, and coho salmon, Kanektok River weir.

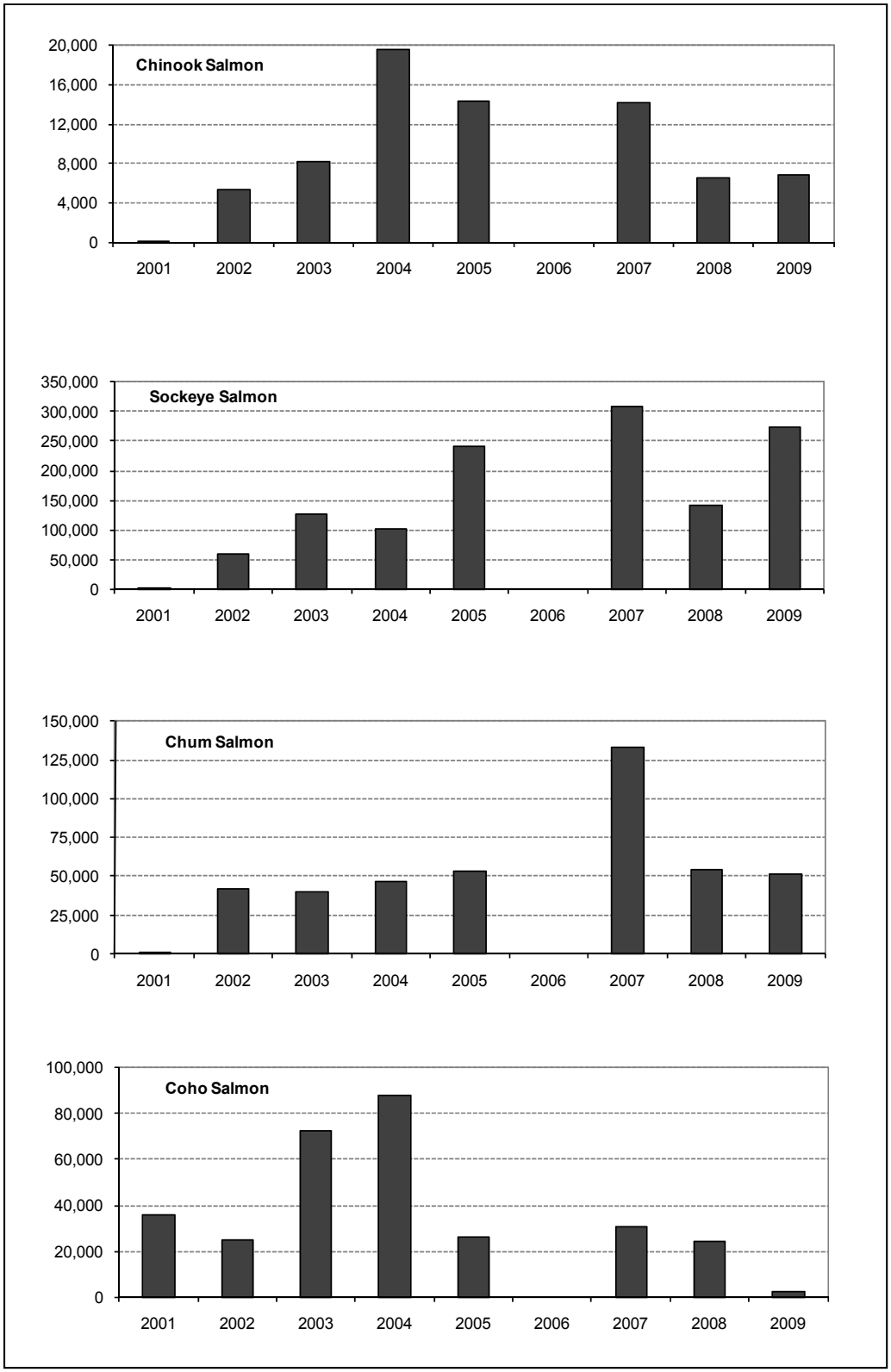


Figure 4.–Age class percentages for Chinook, sockeye, chum, and coho salmon from observed Kanektok River weir escapement and District W-4 commercial fishery, 2009.

APPENDIX A

Appendix A1.–Aerial survey escapement indices of the Kanektok River drainage by species, 1965–2009.

	Chinook			Sockeye			Chum			Coho		
Year	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
1960	0			5,649			0			3,000		
1961	4,328			2,308			18,864			46		
1962	5,526			10,313			45,707			0		
1963	6,555			0			0			0		
1964	4,081			13,422			707			379		
1965	2,976			1,886			4,242			0		
1966	278			1,030			2,610			0		
1967	0	1,349		652			8,087			1,926		
1968	8,879	2,756		5,884			19,497			21,511		
1969	16,802			3,784			38,206			15,077		
1970	18,269			5,393			46,556			16,850		
1971	4,185			3,118			30,208			2,982		
1972	15,880			3,286			17,247			376		
1973	14,993			2,783			19,680			16,515		
1974	8,704			19,510			15,298			10,979		
1975	3,928			8,584			35,233			10,742		
1976	14,110			6,090			43,659			13,777		
1977	19,090	2,012		5,519			43,707			9,028		
1978	12,335	2,328		7,589			24,798			20,114		
1979	11,144	1,420		18,828			25,995			47,525		
1980	10,387	1,940		13,221			65,984			62,610		
1981	24,524	2,562		17,292			53,334			47,551		
1982	22,106	2,402		25,685			34,346			73,652		
1983	46,385	2,542	1,511	10,263			23,090		315	32,442		367
1984	33,663	3,109	922	17,255		143	50,422		376	132,151		1,895
1985	30,401	2,341	672	7,876	106	12	20,418	901	149	29,992	67	622
1986	22,835	2,682	938	21,484	423	200	29,700	808	777	57,544	41	2,010
1987	26,022	3,663	508	6,489	1,067	153	8,557	1,084	111	50,070	125	2,300
1988	13,883	3,690	1,910	21,556	1,261	109	29,220	1,065	618	68,605	4,317	1,837
1989	20,820	3,542	884	20,582	633	101	39,395	1,568	537	44,607	3,787	1,096
1990	27,644	6,013	503	83,681	1,951	462	47,717	3,234	202	26,926	4,174	644
1991	9,480	3,693	316	53,657	1,772	88	54,493	1,593	80	42,571	3,232	358

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Appendix A1.–Page 2 of 2.

	Chinook			Sockeye			Chum			Coho		
Year	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport	Commercial	Subsistence	Sport
1992	17,197	3,447	656	60,929	1,264	66	73,383	1,833	251	86,404	2,958	275
1993	15,784	3,368	1,006	80,934	1,082	331	40,943	1,008	183	55,817	2,152	734
1994	8,564	3,995	751	72,314	1,000	313	61,301	1,452	156	83,912	2,739	675
1995	38,584	2,746	739	68,194	573	148	81,462	686	213	66,203	2,561	970
1996	14,165	3,075	689	57,665	1,467	335	83,005	930	200	118,718	1,467	875
1997	35,510	3,433	1,632	69,562	1,264	607	38,445	600	212	32,862	1,264	1,220
1998	23,158	4,041	1,475	41,382	1,702	942	45,095	1,448	213	80,183	1,702	751
1999	18,426	3,167	854	41,315	2,021	496	38,091	1,810	293	6,184	2,021	1,091
2000	21,229	3,106	833	68,557	1,088	694	30,553	912	231	30,529	1,088	799
2001	12,775	2,923	947	33,807	1,525	83	17,209	747	43	18,531	1,525	2,448
2002	11,480	2,475	779	17,802	1,099	73	29,252	1,839	446	26,695	1,099	1,784
2003	14,444	3,898	323	33,941	1,622	107	27,868	1,129	14	49,833	2,047	1,076
2004	25,465	3,726	228	34,627	1,086	112	25,820	1,112	33	82,398	1209	1362
2005	14,195	3,083	520	68,801	1,633	156	13,529	915	108	51,780	1,443	1,006
2006	19,184	3,521	754	106,308	2,177	523	39,151	1,865	145	26,831	1,019	1,742
2007	19,573	3,412	633	109,343	1,303	385	61,228	1,725	15	34,710	1,143	1,087
2008	13,812	[a]	220	69,743	[a]	654	57,033	[a]	48	94,257	[a]	1,541
2009	13,920	[a]	[a]	112,153	[a]	[a]	91,158	[a]	[a]	48,115	[a]	[a]
10-Year Average[b]	17,058	3,335	609	58,424	1,526	328	33,973	1,350	138	42,175	1,430	1,394
Historical Average	15,995	3,140	816	29,794	1,266	292	33,885	1,316	230	36,845	1,877	1,176

Note: Commercial harvest from District W-4 (Quinhagak), subsistence harvest by the community of Quinhagak, subsistence harvest estimates prior to 1988 are based on a different formula and are not comparable with estimates from 1988 to present (Linderman et al. 2002).

[a] Not available at time of publication.

[b] 10-year average from 1999 to 2008 for Commercial, 1998 to 2007 for subsistence, and 1999 to 2008 for sport.

APPENDIX B

Appendix B1.–Historical escapement, Kanektok River escapement projects, 1996–2009.

Year	Chinook	Sockeye	Chum	Coho
1962	935	43,108	[a]	[a]
1965	[a]	[a]	[a]	[a]
1966		[a]	28,800	[a]
1967	3,718 [a]	[a]	[a]	[a]
1968			14,000	[a]
1969	4,170 [a]	8,000 [a]	[a]	[a]
1970	3,112	1,128	[a]	[a]
1971	[a]	[a]	[a]	[a]
1972	[a]	[a]	[a]	[a]
1973	814	[a]	[a]	[a]
1974	197 [a]	532 [a]	[a]	[a]
1975	1,278 [a]	6,018	[a]	[a]
1976	3,079 [a]	2,936	8,697	[a]
1977	5,787	7,244	32,157	[a]
1978	9,999	44,215	229,290 [b]	[a]
1979	[a]	[a]	[a]	[a]
1980	6,172 [a]	113,931 [a]	[a]	[a]
1981	[a]	[a]	[a]	69,325
1982	7,740	55,940	71,840	[a]
1983	8,890	2,340	[a]	[a]
1984	11,282	30,840	9,360	[a]
1985	13,465	16,270	53,060	46,830
1986	3,643	12,090	14,385	[a]
1987	1,647	20,798	16,790	[a]
1988	11,140	30,440	9,420	20,056
1989	7,914	14,735	20,583	[a]
1990	338	5,507	6,270	[a]
1991	[a]	[a]	2,475	[a]
1992	3,856	14,955	19,052 [c]	4,330
1993	4,670	23,128	25,675	[a]
1994	7,386	30,090	1,285	[a]
1995		2,250	10,000	[a]
1996	6,107 [a]	22,020 [a]	[a]	[a]
1997	7,990 [a]	27,100 [a]	[a]	[a]
1998		6,420	7,040	23,656
1999	202 [a]	6,054 [a]	[a]	5,192
2000	1,744	6,045	10,000	10,120
2001	6,483	38,610	11,440	[a]
2002	[a]	[a]	[a]	[a]
2003	5,430	18,010	2,700	[a]
2004	27,873	7,838	[a]	[a]
2005	13,926	110,730	[a]	[a]
2006	4,875	367,300	[a]	[a]
2007	[a]	[a]	[a]	[a]
2008	3,659	43,900	[a]	[a]
2009	[a]	[a]	[a]	[a]
SEG[d]	3,500–8,000	14,000–34,000	>5,200	7,700–36,000

-continued-

Note: Aerial surveys are those rated as fair to good obtained between 20 July and 5 August for Chinook and sockeye salmon, 20 and 31 July for chum salmon, and 20 August and 5 September for coho salmon.

[a] Survey either not flown or did not meet acceptable survey criteria.

[b] Chum salmon count excluded from escapement objective because of exceptional magnitude.

[c] Some chum salmon may have been incorrectly speciated as sockeye salmon.

[d] Current Kanektok River drainage aerial survey Sustainable Escapement Goals (ADF&G 2004).

APPENDIX C

Appendix C1.–Historical commercial, subsistence, and sport fishing harvests of Chinook, sockeye, coho and chum salmon, Quinhagak area, 1960 through 2009.

Year	Method	Dates of Operation	Chinook	Sockeye	Chum	Pink [a]	Coho
1996	Counting Tower [b]	2–13, 20–25 July	6,827 [e]	71,637 [e]	70,617 [e]	[e]	[e]
1997	Counting Tower [b]	11 June–21 August	16,731	96,348	51,180	7,872	23,172 [e]
1998	Counting Tower [b]	23 July–17 August	[e]	[e]	[e]	[e]	
1999	Tower/Weir [b]	Not Operational					
2000	Resistance Board Weir [c]	Not Operational					
2001	Resistance Board Weir [d]	10 August–3 October	132 [e]	739 [e]	1,056 [e]	19 [e]	35,650
2002	Resistance Board Weir [d]	1 July–20 September	5,343	58,326	42,009	87,036	24,840
2003	Resistance Board Weir [d]	24 June–18 September	8,231	127,471	40,066	2,443	72,448
2004	Resistance Board Weir [d]	29 June–20 September	19,528	102,867	46,444	98,060	87,828
2005	Resistance Board Weir [d]	8 July–8 September	14,331	242,208	53,580	3,530	26,343
2006	Resistance Board Weir [d]	Not Operational					
2007	Resistance Board Weir [d]	19 June–11 September	14,120	307,750	133,215	3,075	30,471
2008	Resistance Board Weir [d]	17 July–21 August	6,578	141,388	54,024	142,430	24,490
2009	Resistance Board Weir [d]	5 July–11 August	6,841	272,483	51,652	1,246	2,336

[a] Picket spacing of the weir panels allows pink salmon to freely pass through the weir unobserved.

[b] Project located approximately 15 river miles from the mouth of the Kanektok River.

[c] Project located approximately 20 river miles from the mouth of the Kanektok River.

[d] Project located approximately 42 river miles from the mouth of the Kanektok River.

[e] No counts or incomplete counts as the project was not operational during a large portion of species migration.